OPEN ACCESS Int. J. Agr. Ext. 10 (01) 2022. 169-181 DOI: 10.33687/ijae.010.01.4041

Check for updates

Available Online at EScience Press

International Journal of Agricultural Extension

ISSN: 2311-6110 (Online), 2311-8547 (Print)

https://esciencepress.net/journals/IJAE

AGRICULTURAL EXTENSION SYSTEMS RESPONSE TO COVID-19 OUTBREAK IN EGYPT AND NIGERIA

[a]Ola M. S. Elkashef, [b]Tamer G. I. Mansour*, [c]Oyediran W. Oyeleke

[a] *Agricultural Extension Education Department, Faculty of Agriculture (El-Shatby), Alexandria University, Alexandria, Egypt.*

[b] *Agricultural Economic Department, Agricultural and Biology Research Institute, National Research Centre, Giza, Egypt.*

[c] *Department of Agricultural Extension and Rural Development, Federal University of Agriculture, Abeokuta, Nigeria.*

ARTICLE INFO

Article History

Received: December 2, 2022

Revised: February 15, 2022

Accepted: March 19, 2022

Keywords

Agricultural extension

COVID-19, Pandemic

Precautionary procedures

Egypt

Nigeria

ABSTRACT

COVID-19 pandemic has brought setbacks to all human endeavours globally, in the sectors of health, education, tourism, and agriculture. African agriculture is greatly affected by the pandemic and lockdown, in particular the peasant farmers. In this regard, the agricultural extension service which has been responsible for the dissemination of innovation to the farmers becomes an indispensable platform to sensitize farmers on COVID-19 and preventive measures. Hence, this paper aimed to investigate the agricultural extension systems' response to the COVID-19 outbreak in Egypt and Nigeria. A questionnaire was administered to 200 extension agents randomly selected from the government institutions in Egypt and Nigeria. The results showed that the degree of agricultural extension staff commitment to the precautionary measures for the COVID-19 epidemic in Nigeria ($\bar{x}$ = 6.32) was higher than that in Egypt ($\bar{x}$= 2.59). Nigerian agricultural extension agents recorded a higher contribution ($\bar{x}$=8.82) at reducing the spread of COVID-19 than Egyptian counterparts ($\bar{x}$ = 5.52). Although the demand for agricultural extension service in Nigeria is twice that of Egypt, extension service delivery during COVID-19 in the two countries was affected by frequent changes in the operating plans, poor funding, and inconsistent internal work system. The study recommends, establishing an electronic extension platform and coordinating agricultural extension services (AES) actors including private and public sectors, non-governmental organizations (NGOs), producer organizations (POs) and the ministry of health (MOH) to face this crisis, especially in Egypt.

Corresponding Author: Tamer G. I. Mansour

Email: Tamer_baz@yahoo.com

INTRODUCTION

Currently, the COVID-19 pandemic has unleashed a health and economic crisis of unprecedented scale and scope; it is considered the worst economic crisis facing the global economy since the great depression in the 1930s. This epidemic which started in Wuhan - China, in December 2019 halted the worldwide development agenda and economic plans for all nations around the world through its repercussions (World Bank, 2020). Especially, developing countries will be less prepared to deal with the crisis due to the lack of access to information and public services. Several countries in Africa such as Egypt and Nigeria have implemented restrictive measures, including self-isolation and social distancing in one side. On the other hand, travel, trade and markets are restricted to limit the spread of the

epidemic (Bereir, 2020). These unforeseen hindered the ability to earn a living which can limit the production and provision of food, in addition, it negatively affected the economic sectors at different levels.

The African agriculture sector is one of the main sectors as the backbone of economic development on the continent; which generates approximately 15% of the continent's GDP annually and employs 70% of the total workforce. During the COVID-19 outbreak, this sector was further affected by widespread disruptions in international markets, which hindered agricultural commodities and the export of oil, as well as agricultural inputs and imports of foodstuffs. This impeded the continued fulfilment of demand, providing income, livelihoods, and guaranteeing security, health, and wellbeing for millions of rural labourers and producers (ILO, 2020). It is likely leading to low agricultural productivity and high poverty rates that reflect negatively on accomplishing nourishment security (Willy *et al.*, 2020). Consequently, it threatens the achievement of the second Sustainable Development Goal aimed at ending hunger, achieving food security, and improving nutrition (Nicola *et al.*, 2020; Niles *et al.*, 2020). Food security is a global concern with limited resources and increasing demand, about 10% of the world's population and 19% of Africans are severely food insecure (FAO and UNICEF, 2021). Furthermore, there is no dispute that agricultural production plays a major role in achieving food security, especially in times of international crises. In this regard, attention to agricultural production during these crises is a top priority for governments in Egypt and Nigeria as the largest of the African countries.

In Egypt, agricultural production was negatively affected by the COVID-19 epidemic, as it poses a serious threat for farmers and rural residents, and for their participation in the economic and social activities of their rural communities, which is reflected in the large losses in their incomes (FAO, 2020b). This may be due to several constraints found in many Egyptian rural villages as a weakness of the agricultural extension agency and development organizations during the Coronavirus crisis management. As well as the limited use of communication and information technology, poor marketing facilities, inadequate training programs regarding the prevention of Covid-19, also, the shortage of qualified agricultural workforce (Elramily, 2021; Diab and Yacoub, 2020).

As for Nigeria, which has twice the population of Egypt, the COVID-19 pandemic affects agricultural production through its devastating effects on the production and distribution of inputs. In this context, the epidemic has negative impacts on the supply of fertilizers, seeds, and agrochemicals to farmers as a result of the reduced capacity to manufacture and import the main chemical components of fertilizers and pesticides (Willy et al., 2020). Moreover, the lockdown had very difficult impacts on Nigerian farmers; who make up about 85% of informal sector operators whose livelihood depends on their daily activities (Omodero et al., 2018) by restricting farmers to market agricultural products, and lack of agricultural labour (Puneet et al., 2020). This widened Nigeria's food insecurity gap.

Therefore, it is of paramount importance to mobilize all efforts from individuals, institutions, and bodies both the public and private sectors, as well as civil society institutions to achieve the most appropriate and timely response. Here, there is a need for Extension and Advisory Services (EAS) systems that should play a leading role on the front lines of the epidemic response in rural areas (FAO b, 2020). This role is primarily reserved for extension workers who often work side by side with the front-line community of farmers for assisting with the rural targets (Telg *et al.*, 2008). In this regard, the agricultural extension services systems in Egypt and Nigeria that faced several challenges need to "innovate from within" rapidly to ensure an efficient response to COVID-19. These innovations include enhancing the coordination of agricultural extension services systems consisting of public and private actors, and producer organizations, to enter into partnerships with several (often non-traditional) organizations (FAO, 2020a).

Accordingly, the Food and Agriculture Organization of the United Nations (FAO) plays an effective role in providing recommendations regarding applying precautionary procedures of extension staff like wearing a mask, avoiding crowded places, using alcohol hand sanitisers, avoiding shaking hands, etc. The organization recommends that some measures should be taken for the safety of extension staff and rural residents from the COVID-19 epidemic such as reducing the employee's number, measuring the temperature of all employees, etc. FAO is currently implementing several technical assistance projects related to strengthening agricultural extension and advisory services systems in more than 30

countries in Africa which are already adapted to meet the challenges of the COVID-19 outbreak (FAO, 2020b). In this context, the current research came as an attempt with the aim to identify the agricultural extension system response to the pandemic, as it is the most important sector concerned with agricultural development, and the one most closely related to farmers for interacting with the Corona crisis in two of the most important countries of the African continent, and the largest in terms of population which are Egypt and Nigeria. The specific objectives of this study were to:

- Identify the commitment degree of agricultural extension staff to precautionary procedures of the COVID-19 epidemic in Egypt and Nigeria.
- Determine the agricultural extension systems contributions to reduce the COVID-19 impact in Egypt and Nigeria.
- Identify the impact of the COVID-19 outbreak on the agricultural extension sector in Egypt and Nigeria.
- Learn about the extension staff's suggestions for the appropriate response to the COVID-19 pandemic.

Research hypotheses

- There are no statistically significant differences between the mean scores of agricultural extension workers' commitment regarding precautionary procedures applying of COVID-19 pandemic in Egypt and Nigeria.
- There are no statistically significant differences between the mean scores of the agricultural extension system contribution for addressing the crisis in Egypt and Nigeria.

METHODOLOGY

Study area

This study was carried out on the agricultural extension agents in Fayoum Governorate, Egypt, and Ogun State, Nigeria (Figure 1). Ogun State lays southwest Nigeria on the latitudes 7018'N and longitude 5055'E. In the 2016 census conducted, it has a population of 5,217,700 people (NPC, 2016). Ogun State is divided into four zones (Abeokuta, Haro, Ikenne, and Ijebu-Ode). Agricultural Development Program (ADP) provides agricultural extension services in Nigeria. It is the extension arm of the state's ministry of agriculture all over the country. The city has a rainfall pattern that supports agricultural practices, arable and cash crops are cultivated for livelihood. Poultry farming thrives very well in every part of the state capital. The Federal University of agriculture is also sited at Abeokuta. In Ogun State, there are 32 Urban areas, 14 General hospitals, and 236 primary health centers. As of 11th January 2021, the confirmed cases of covid-19 were 2,103 persons with 31 deaths.

Fayoum Governorate - the largest natural oasis in Egypt- is one of the Egyptian governorates, it is located between latitudes 29.6 and 29.35 north and longitudes 30.23 and 31.5 east in the Western Desert in the southwest of Cairo governorate and at a distance of 90 km from it, its total area is 6068.70 square kilometers with a population of 3.8 million citizens, the governorate's agricultural area is 434.6 thousand feddans (feddan=0.42ha). In Fayoum Governorate, there are 6 hospitals, 11 urban health centres and 159 rural health units, the number of confirmed corona cases reached 1280 cases as of May 2020 (Fayoum Governorate Site, 2021).

Sampling Technique

A sample of 97 personnel was randomly selected out of the total number of agricultural extension agents in the four zones of the Agricultural Development Program (ADP) in Ogun State, Nigeria which were 132 extension personnel (OGADEP, 2021) according to Krejcie and Morgan (1970). In the same way, a simple random sample of 103 extension personnel was selected from 141 agricultural extension agents in all agricultural cooperative societies and extension centers in Fayoum Governorate, Egypt (Fayoum directorates of Agriculture, 2021). A total of 200 extension agents were the sample size for this study in the two countries.

Data Collection and measurement of variables

Data were collected from December 2020 until February 2021, using a structured questionnaire by personal interviews with the respondents. Additionally, some questionnaires were sent by e-mail and mobile phone due to the COVID-19 pandemic and lockdown to prevent physical contact and the spread of the coronavirus. The questionnaire was presented to a group of agricultural extension professors in Egypt and Nigeria to ensure its validity and suitability, a pre-test was done before data collection. The questionnaire form included five parts which are: 1- The first part includes a set of questions to

measure some personal variables of the surveyed extension agents. 2- The second part contains questions to measure the extent of the extension staff's commitment to precautionary procedures by giving each procedure one score for implementation and zero for non-implementation; the maximum theoretical score per respondent was ten while the minimum was zero. 3- The third section includes questions related to the critical contributions of the agricultural extension systems to address the crisis; the maximum theoretical score per respondent was 14 while the minimum was zero. Regarding the previous two items, the respondents were classified into three categories (low, medium, and high) using the mean and standard deviation (Jat and Yadav, 2016; Khandait *et al.*, 2011). 4- The fourth part consists of questions related to the impact of the COVID-19 outbreak on the agricultural extension sector in Egypt and Nigeria. 5- The last part suggestions activating the agricultural extension role for immediate response during the COVID-19 pandemic.

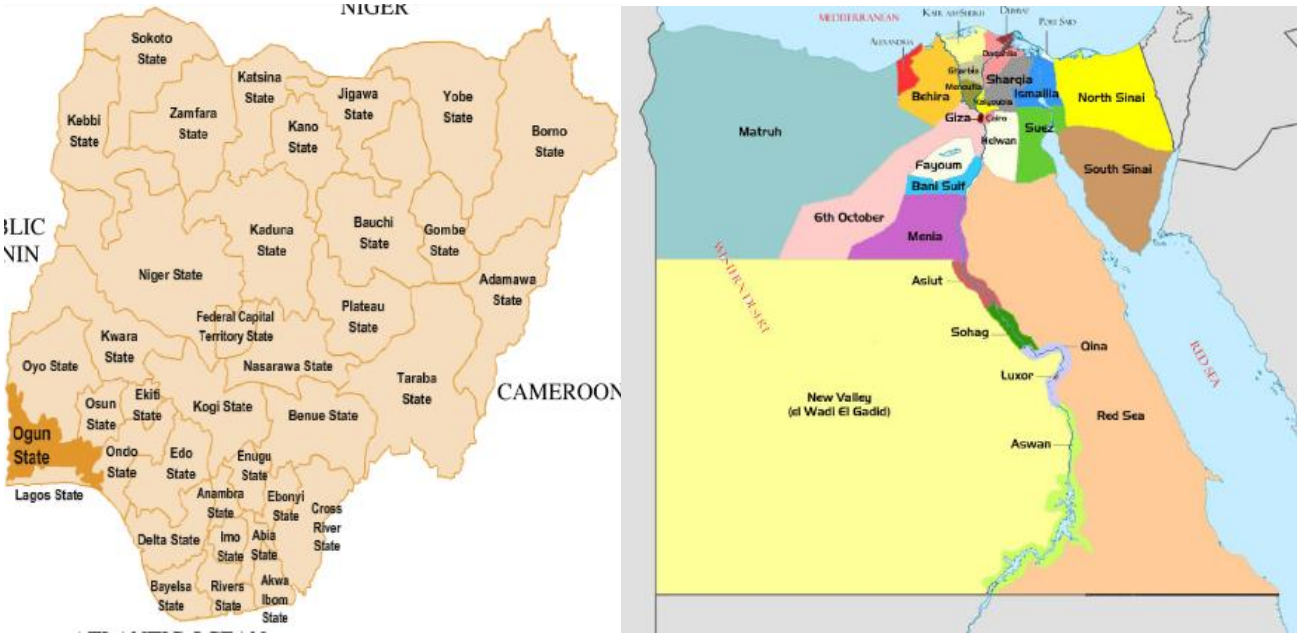

Figure 1. Nigeria and Egypt Maps showing Ogun State and Fayoum Governorate.

Data analysis

Descriptive statistics such as frequency distribution, percentages, means, and standard deviation were used for the categorization and description of the variables. Also, a comparison was carried out using Independent Samples t-test to detect the significant differences between the mean scores of respondents concerning each of the covered two items (precautionary procedures and critical contributions) among the two studied countries.

RESULTS AND DISCUSSION

Socio-economic characteristics of respondents

The results in Table 1 showed that the age average of extension agents in Egypt and Nigeria was relatively close with 49 years and 42.1 years, respectively. The age distribution in the two countries was relatively close with 32.9% in Egypt and 32.4% in Nigeria within the age category 33–45 years; 67.1% in Egypt and 61.8% in Nigeria fell into the age category 46–59 years. It may be inferred from this result that most of the extension agents belong to the middle and upper age categories, which leads them to gain relatively high experience in dealing with the Corona crisis (Vincent and Balasubramani, 2020). Also, 81.2 and 73.5% of extension agents in Egypt and Nigeria were males. This is an indication of gender disparity in the organization. However, the proportion of female extension agents is higher in Nigeria (26.5%) than in Egypt (18.8%). From the educational qualification perspective, it was revealed that agricultural extension services in Nigeria have 61.8% university graduates as personnel compared to 25.9% in Egypt. Likewise, 61.8% were specialized

extension agents in Nigeria unlike 38.8% specialized extension agents in Egypt. The extension service in Egypt allows agents from diverse professional backgrounds to its workforce (61.2%) than in Nigeria (38.2%).

In terms of experience, 75.3% of the extension agents in Egypt have higher experience (above 20 years) than their counterparts in Nigeria (2.9%). The mean value for the experience of extension agents in Egypt was 21.76 years compared to 8.38 years in Nigeria. Taking into consideration that agricultural extension employees in Egypt enter the service early after obtaining the intermediate qualification certificate. All the extension agents in Egypt did not receive training on the COVID-19 pandemic. In contrast, around 56% of extension agents in Nigeria attended 1 – 3 courses on the COVID-19 pandemic (Table 1). This is an indication that the Nigerian government is very proactive on COVID-19 and ensures that extension agents have access to training. In this regard, various ministries have had a concrete role and strong effort to combat COVID-19 in Nigeria (Oyeranti and Sokeye, 2020). The results further revealed that none of the extension agents in Nigeria was infected with COVID-19, only 4.7% of cases were reported among extension agents in Egypt. This situation in Nigeria could be attributed to intensive training on COVID-19 preventive measures.

Table 1. Socio-economic characteristics of respondents (N=200).

Characteristics	Egypt (n=103)	Nigeria (n=97)
	%	%
	Age	
Youth (20-32)	0.0	5.8
Middle- age (33-45)	32.9	32.4
Elder (46-59)	67.1	61.8
Mean ± SD	49.00 ±6.396	42.09 ±5.879
	Gender	
Male	81.2	73.5
Female	18.8	26.5
	Education	
Secondary	74.1	38.2
University	25.9	61.8
Mean ± SD	13.04 ±1.762	15.25 ±2.832
	Specialization	
Agric. extension	38.8	61.8
Other	61.2	38.2
	Experience	
less than 10 years	12.9	58.8
10–20 years	11.8	38.3
21 years and more	75.3	2.9
Mean ± SD	21.76 ±6.9	8.38 ±3.9
	Training about covid	
No training	100	20.6
1 - 3 courses	0.0	55.9
4 - 5 courses	0.0	23.5
Mean ± SD		2.29 ±1.69
	Infection of Covid-19	
Yes	4.7	0.0
No	95.3	0.0

Source: Field survey, 2021

The agricultural extension staff' commitment to apply precautionary procedures of COVID-19 pandemic

Figure 2 indicates that 79.4% of extension workers in Nigeria wear a face mask while being with others but 32.9% wear a mask in Egypt. More than three quarter (76.5%) of extension agents avoid touching eyes, nose, and mouth in Nigeria, only fewer (11.8%) of extension agents followed this recommendation in Egypt. Use a tissue in case of coughing or sneezing and avoid crowded or indoor places as mentioned by 73.50%, 21.20% in Nigeria and Egypt, respectively. The majority of extension agents in Nigeria (70.6%) were using alcohol hand sanitizers or soap and water compared to 44.7% who did the same thing in Egypt. Results also showed that 64.70% of respondents avoid shaking hands and kisses altogether, whereas 47.10% of extension agents did this procedure in Egypt. While 61.8% of extension agents did hand hygiene before and after wearing the mask in Nigeria, very few (11.8%) complied with hand hygiene in Egypt. The results also indicated that only 41.2% of the respondents adhered to applying a social distance of not less than one meter from others in Nigeria, while this percentage was in Egypt only (20%) of the respondents; the compliance to this particular recommendation is low in the two countries. From these findings, it can be deduced that agricultural extension staff's commitment to applying precautionary procedures to the COVID-19 pandemic was higher in Nigeria than in Egypt. This high commitment among agricultural extension staff in Nigeria is a product of continuous training of the extension agents in the country. These results are consistent with Ajaero *et al.* (2021) who mentioned that 85% of rural extension professionals in Nigeria use face masks, regular hand washing (78.3%), avoiding contact with the eyes (55.8%), avoidance of handshake (73.3), 71.7% use of protective equipment's and covering the mouth while coughing by 82.5% of respondents. Results also mentioned that 67% of the respondents were classified as low implementation level of COVID- 19 precautionary procedures in Egypt. While, in Nigeria, 53% have a medium executive level of the same procedures (Table 2).

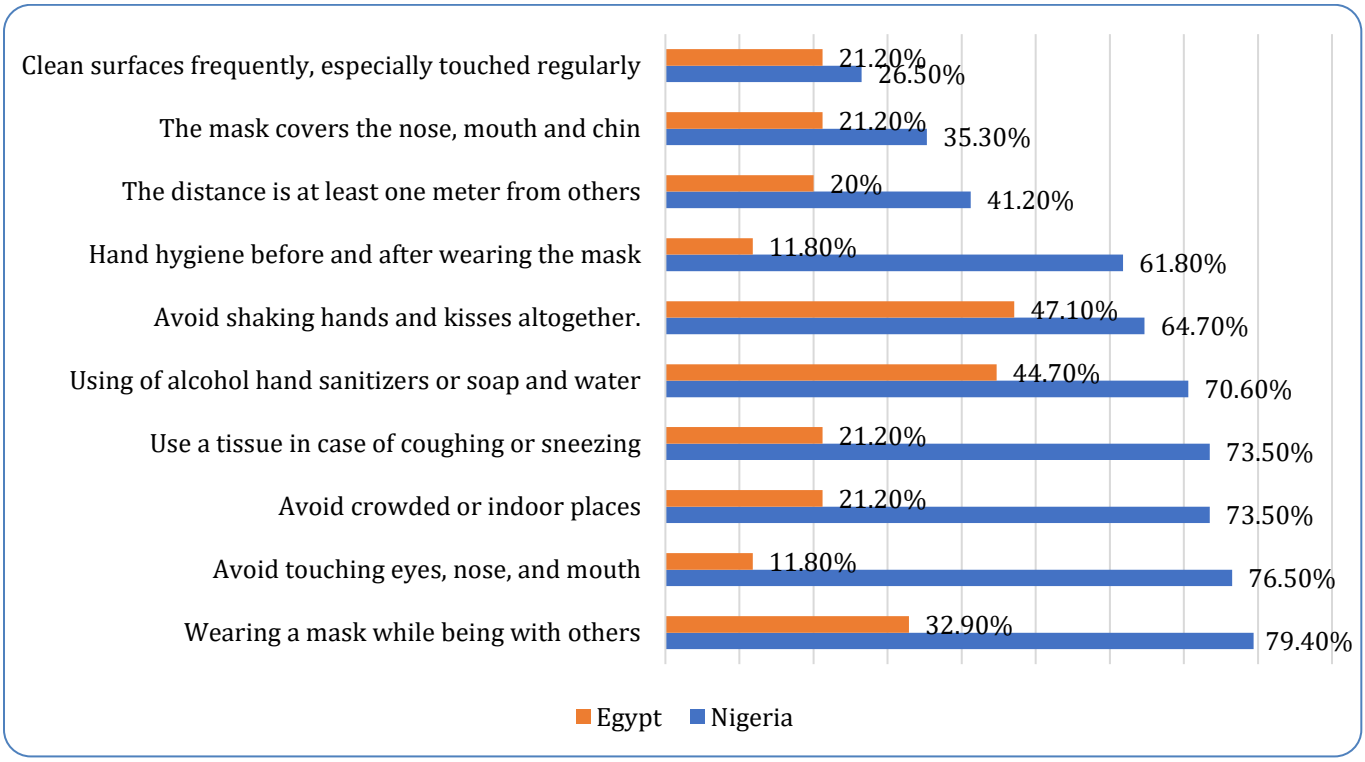

Figure 2. Distribution of respondents according to their implementation of COVID- 19 safety procedures in Egypt and Nigeria (N=200).

Table 2. Distribution of respondents according to their implementation level of COVID- 19 precautionary procedures in Egypt and Nigeria (N = 200).

Category	Egypt (n=103)	Nigeria (n=97)	Overall
	%	%	%
Low level	67.0	5.9	49.6
Medium level	11.8	52.9	23.5
High level	21.2	41.2	26.9
Mean ± SD	2.59 ± 2.76	6.32 ± 1.99	3.66 ± 3.06

Source: Field survey, 2021.

The results indicated a statistically significant mean differences (P<0.01) between degrees of extension agents' commitment concerning the precautionary measures against the COVID-19 in Egypt and Nigeria (Table 3). In this regard, the null hypothesis is rejected. The extension staff in Nigeria had a significantly higher mean score (6.32) compared to the extension staff in Egypt (2.59) (Table 2) regarding applying recommended precautionary procedures of COVID-19 outbreak. This might be due to the high educational level of the respondents in Nigeria compared to Egypt, where Oduwole *et al.* (2013) emphasized that educational level and training programs are positively correlated with respondents' ability to receive and understand information, additionally, the ministry provided training programs and personal protective equipment distribution of this new disease for workers on the front lines of most institutions, where the ministry is strongly supported by Nigeria Center for Disease and Control (Oyeranti and Sokeye, 2020). Therefore, attention should be paid to training programs for health education with the need to adhere to these procedures, especially those with low educational backgrounds in Egypt (Abdelhafiz *et al.*, 2020).

Table 3. Differences between the agricultural extension agents commitment regarding precautionary procedures applying of COVID-19 pandemic in Egypt and Nigeria (N = 200).

	Levene's test for equality of variances		t- test for equality of means			
	F	Sig.	T	Sig.(t-tailed)	Mean Differences	Std. Error Differences
Equal variances assumed	0.103	0.749	-13.041	0.00	-3.727	0.286
Equal variances not assumed			-13.067	0.00	-3.727	0.285

Source: Field survey, 2021.

The contributions of the agricultural extension system for minimizing the impact of the COVID-19 pandemic

Agricultural extension and advisory services providers assume an essential role in countering and controlling COVID-19 (Boyce and Katz, 2019). Additionally, their insight and preparedness in managing COVID-19 are imperative to prevent and control the spread of irresistible diseases (Allegranzi and Pittet, 2007). As shown in figure 3, results reported that an equal proportion (82.4%) of extension staff provides health advice to farmers regarding measures to prevent infection with the COVID-19 pandemic in Egypt and Nigeria. Also, 71.8% of extension staff in Egypt and 76.5% of extension staff in Nigeria spread awareness among workers in crisis management. Likewise, 58.8% and 76.5% of extension staff raised awareness about COVID-19 in rural areas by providing accurate and timely information in Egypt and Nigeria, respectively. The majority (76.5%) of extension staff in Nigeria mentioned coordination with the Ministry of Health and other relevant government agencies to face the crisis compared to 30.6% of extension staff in Egypt. Hence the need for expanded and enhanced cooperation with public health agencies has significant positive impacts, particularly on rural communities (Buys and

Rennekamp, 2020). 76.5% of the extension staff surveyed in Nigeria indicated that a national working group has been formed to manage the COVID-19 pandemic and study its impact on the agricultural sector. However, only 27.1% of the extension staff in Egypt indicated the formation of this committee.

The majority of extension staff in Nigeria (76.5%) indicated the involvement of the private sector and civil society organizations in the crisis, while (15.3%) of extension staff in Egypt see the presence of the private sector in this crisis. These previous results are in agreement with Tripathi *et al.* (2020) who stated that healthcare professionals (57.9%) and health organizations (89.6%) are able to communicate effectively with participants by persuading them and making them understand patterns and stages of infection. While, 51.8 and 70.6% of extension staff assessed the field situation regarding the effects of the disease in rural areas to identify urgent solutions to farmers' needs in Egypt and Nigeria, respectively as shown in figure 3. Internet and social media platforms were considered the most important source of information (Yue *et al.*, 2021). Results indicated that 70.6% of extension staff in Nigeria facilitate access to online market information to overcome market disruptions for farmers unlike the few (21.2%) in Egypt. This is an indication of changing the agricultural extension services (AES) method from traditional face-to-face agricultural advisory to supporting farmers with digital tools to facilitate market access and certified agricultural inputs in Nigeria (Olayemi, 2020). Inform the government regularly about the situation in the field and the challenges facing farmers as reported by 68.20%, 50% in Egypt and Nigeria, respectively.

The use of smartphones to communicate with farmers during the first wave of the disease outbreak is higher in Nigeria (67.6%) than in Egypt (16.5%). Expanding the implementation of online educational extension platforms by the Internet and going digital to ensure continuous support for rural producers during the quarantine period was acknowledged by 15.3% of extension staff in Egypt and 55.9% of extension staff in Nigeria. Therefore, attention should be paid to promoting health education and public awareness by multiple channels, especially social media platforms. Likewise, Nigerian extension staff is far ahead (55.9%) of Egypt extension staff (9.4%) to plan and implement extension training programs for farmers to deal with the crisis (Figure 3). Overall, the findings revealed higher contributions of extension staff in Nigeria towards reducing the impact of the COVID-19 pandemic than in Egypt.

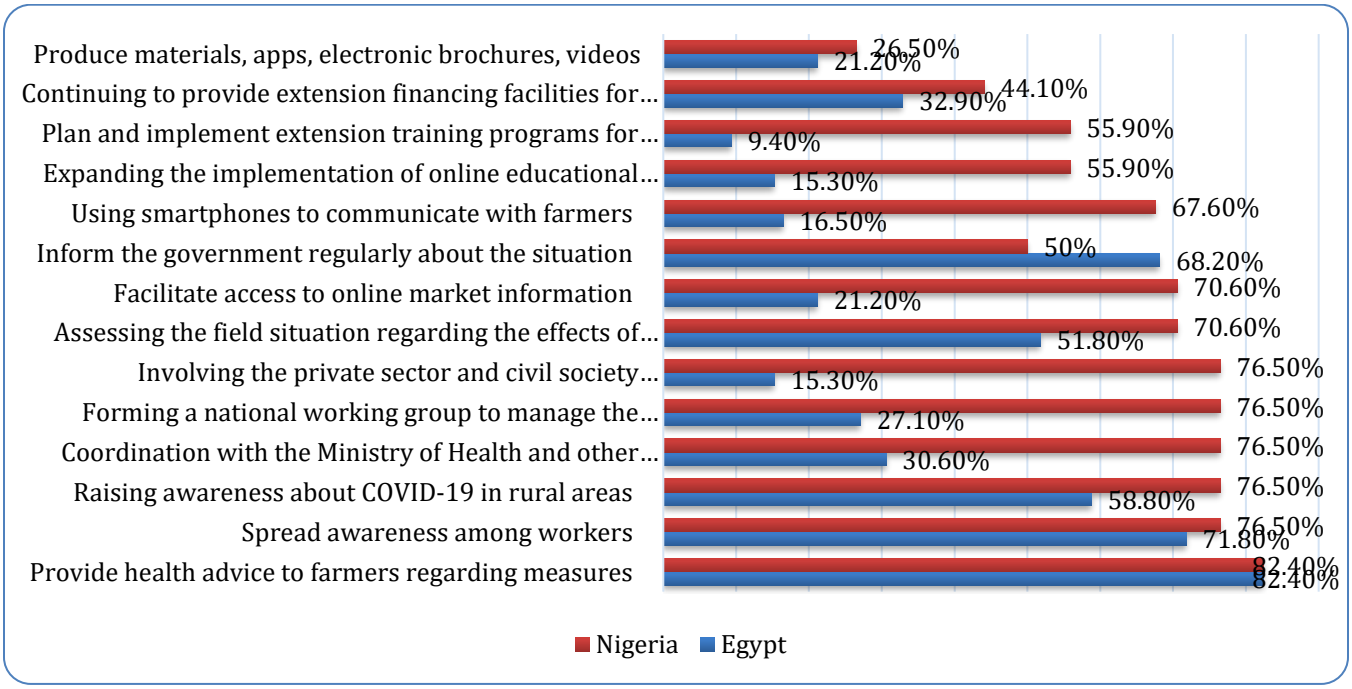

Figure 3. The contributions of the agricultural extension system for minimizing the impact of the COVID-19 pandemic (N = 200).

Results further also revealed that around all of the respondents (97.5%) were classified as low and medium level regarding applying of required critical contributions in Egypt. While, in Nigeria, the majority of the respondents (94.1%) have a medium and high level of the same contributions (Table 4). In this regard, the results indicated that there were statistically significant differences (P< 0.01) between the mean scores of the agricultural extension system contribution for addressing the crisis in Egypt and Nigeria (Table 5). As the extension staff in Nigeria had a significantly higher mean score (8.82) compared to the extension staff in Egypt (5.52) concerning applying recommended critical contributions for reducing the impact of the COVID- 19 pandemic. Consequently, the null hypothesis was rejected.

Table 4. Respondent's distribution according to their opinion about agricultural extension contributions level to reduce the impact of COVID-19 in Egypt and Nigeria (N = 200).

Category	Egypt (n=103)	Nigeria (n=97)	Overall
	%	%	%
Low level	52.9	5.9	39.5
Medium level	44.7	52.9	47.1
High level	2.4	41.2	13.4
Mean ± SD	5.52 ± 1.52	8.82± 2.31	6.46 ± 2.32

Source: Field survey, 2021

These significant differences, which were indicated in Table 5, could be a result of using extension services providers in Nigeria of mobile phone apps such as Facebook, WhatsApp, Instagram, YouTube, Twitter, as well as the Zoom application for video conferencing and webinars. In addition, several digital platforms were developed by organizations in the country to boost rural farmers and actors in the agricultural value chain like Ikore E-Extension, Interactive Voice Response (IVR), Releaf.NG Program, Agrodata and Hello Tractor. Also, digital empowerment opportunities for extension staff by providing technical training and infrastructure to promote the performance of private and public extension staff (Olayemi, 2020).

Table 5. Differences between the mean scores of the agricultural extension system contribution for addressing the crisis in Egypt and Nigeria (N = 200).

	Levene's test for equality of variances		t- test for equality of means			
	F	Sig.	T	Sig.(t-tailed)	Mean Differences	Std. Error Differences
Equal variances assumed	1.183	0.278	-11.215	0.00	-3.291	0.293
Equal variances not assumed			-11.123	0.00	-3.291	0.296

Source: Field survey, 2021

The impact of the Covid-19 pandemic on the agricultural extension sector

Table 6 mentions that almost all (97.1%) of extension staff in Nigeria and 65.9% in Egypt complained that changing operating plans was a major challenge to the service delivery during the corona pandemic crisis. A higher proportion of extension staff in Egypt (83.5%) indicated that reducing funding resources was a serious problem compared to 55.9% in Nigeria. It means that reduction in the cost has caused a serious setback to agricultural extension services in Egypt than Nigeria. It is noteworthy that in the context of limited financial resources, extension systems stimulated by externally funded programs tend to be short-term, because once external financing is exhausted; No local support for higher funding levels (Feder *et al.*, 2006). The majority of extension staff in Nigeria (73.5%) pointed to the change in internal work systems as a serious challenge to service delivery while only very few (17.6%) reported this scenario in Egypt. This is to say that Egypt has a more stable internal work system than Nigeria. This could be explained as the agricultural extension services

(AES) method has changed from traditional face-to-face agricultural advisory to support farmers with digital tools for presenting agricultural practices during the COVID-19 outbreak (Olayemi, 2020). It is also clear from the data presented in Table 6 that 62.8% of extension staff in Egypt indicated a lack of demand for extension services as against fewer (32.4%).This result is in accordance with studies conducted in Sudan and Zimbabwe reported that social distancing, travel bans, movement restrictions, workforce reduction, and other government rules have negatively affected all agricultural extension services; including training, field visits, coordination meetings, distribution of agricultural inputs and pest control during a pandemic, which are critical for farmers for continuing their sustainable agricultural activities (Bereir, 2020; Bright *et al.*, 2021). While 58.8% of extension staff in Nigeria complained about the reducing salaries, 17.6% of extension staff in Egypt indicated reducing salaries as a problem. A higher proportion (47.1%) of Nigerian extension staff reported low-quality internet connection in some governorates than in Egypt (16.5%). Likewise, 41.2% of extension staff in Nigeria reported poor skills for workers to work remotely compared to 29.4% in Egypt. From all indications, the two countries encountered varying degrees of challenges during the COVID-19 pandemic. Therefore, it is important to find urgent solutions so that the agricultural extension systems can play their role effectively in helping farmers to continue their production in light of this crisis (Bereir, 2020).

Table 6. Respondents' distribution according to their opinions towards the challenges that faced the agricultural extension sector during the pandemic in Egypt and Nigeria (N= 200).

Challenges	Egypt (n=103)	Nigeria (n=97)
	%	%
Lack of demand for extension services	62.4	32.3
Changing operating plans	65.9	97.1
Reducing funding resources	83.5	55.9
A change in internal work systems	17.6	73.5
Reducing salaries	17.6	58.8
Low quality internet connection in some governorates	16.5	47.1
Poor skills for workers to work remotely	29.4	41.2
Unavailability of appropriate devices to work at home	40.0	5.9

Source: Field survey, 2021

Suggestions to activate the agricultural extension role for immediate response during the COVID-19 pandemic

Data presented in Table 7 reveal that enhancing infrastructure, institutional settings, and the individual's ability to benefit from digital information and services was supported by 96.5% and 85.3% of extension staff in Egypt and Nigeria respectively. This recommendation becomes necessary because infrastructure supports agricultural development. Accordingly, telecommunication companies must reasonably reduce data charges in addition to making efforts to put in place infrastructure to cover the remaining hard-to-reach areas (Bright *et al.*, 2021). A strong agreement was indicated by extension staff in Egypt (84.7%) and Nigeria (94.1%) for the implementation of Information and Communication Technology (ICT) such as (SMS), radio, television, e-extension platforms, drones, online marketing, and social media. This suggestion could be attributed to the accelerated rate of internet and ICT development which has resulted in efficient and effective global communication, particularly for providing agricultural extension services during national lockdowns (Barber *et al.*, 2016; Bright *et al.*, 2021).

Findings as shown in Table 7 stated that 81.2% of extension staff in Egypt and 94.1% of extension staff in Nigeria agreed with the recommendation that would facilitate access to locally available agricultural inputs such as strengthening seed banks at the community level to avoid group contacts. Access to agricultural inputs is essential so the governments must support farmers to ensure an efficient supply of vital agricultural inputs to improve productivity, reduce nutrition and food insecurity in the two countries, as pointed out by Ali and Khan (2020). Meanwhile, 65.9% and 85.3% of extension staff strongly recommend addressing emerging social issues, by facilitating links with social protection services and developing social safety nets in Egypt and

Nigeria, respectively. This is to minimize the impacts of the COVID-19 pandemic on the farmers and to forestall the future crisis. Providing an unemployment allowance for the unemployed was recommended by 84.7% and 76.5% of extension staff in Egypt and Nigeria respectively. Most (82.4%) of the Nigerian extension staff supported joint coordination and planning of actors at the local and national levels compared to 50.6% of extension staff in Egypt. Advice on alternative income generation opportunities was however got strong support from Egypt (62.4%) and Nigeria (79.4%). This suggestion is crucial as it would help farmers to have multiple sources of income that could be used for their households' needs. Additionally, building partnerships to overcome market disruptions while encouraging e-commerce got support from 78.8% of extension staff in Egypt and 64.7% of extension staff in Nigeria. 65.9% of extension staff in Egypt and 73.5% of extension staff in Nigeria recommended increasing agricultural bank loans for seasonal crops and postponing loan instalments owed by farmers to the Agricultural Bank. It is believed that bank loans would cushion the effect of losses by the farmers due to the COVID-19 pandemic. As confirmed by Yamano *et al.* (2020) about the necessity of providing payment facilities to insolvent farmers. The extension staff from the two countries unanimously (67.1%) suggested directing allocations for activities that were suspended due to the crisis in other sectors to the agricultural sector. Furthermore, 64.7% and 67.6% of extension staff suggested activating the health insurance law for farmers in Egypt and Nigeria respectively. Extension staff that recommends reducing energy prices for agricultural production was higher in Nigeria (61.8%) than in Egypt (18.8%) (Table 7). Hence, both private and government companies can assist rural farmers with uninterrupted and solar power supply systems through purchase support to handle constant power outages in Nigeria (Olayemi, 2020).

Table 7. Suggestions of respondents concerning activating the agricultural extension role during the COVID-19 pandemic in Egypt and Nigeria (N= 200).

Suggestions	Egypt (n=103)	Nigeria (n=97)
	%	%
Enhancing infrastructure, institutional settings, and the individual's ability to benefit from digital information and services	96.5	85.3
Implementation of Information and Communication Technology (ICT) such as Short Message Service (SMS), Interactive Voice Response (IVR), radio, television, e-extension platforms, drones, online marketing, social media, etc.	84.7	94.1
Facilitate access to locally available agricultural inputs such as strengthening seed banks at the community level to avoid group contacts.	81.2	94.1
Addressing emerging social issues, by facilitating links with social protection services, and developing social safety nets	65.9	85.3
Providing an unemployment allowance for the unemployed	84.7	76.5
Promote joint coordination and planning of actors at the local and national levels	50.6	82.4
Advice on alternative income generation opportunities	62.4	79.4
Building partnerships to overcome market disruptions while encouraging e-commerce	78.8	64.7
Increasing agricultural bank loans for seasonal crops and postponing loan installments owed by farmers to the Agricultural Bank	65.9	73.5
Directing allocations for activities that were suspended due to the crisis in other sectors to the agricultural sector	67.1	67.6
Activating the health insurance law for farmers	64.7	67.6
Make use of local contacts, mechanisms and networks, such as cooperatives, producer organizations, community leaders, farmers, self-help on a large scale when taking measures that restrict mobility.	34.1	64.7
Reducing energy prices for agricultural production	18.8	61.8

CONCLUSION AND RECOMMENDATIONS

The study has highlighted the high commitment of agricultural extension staff in Nigeria regarding applying precautionary procedures to the COVID-19 pandemic. Moreover, the study also identified higher contributions of extension staff in Nigeria towards minimizing the impact of the COVID-19 outbreak than in Egypt as expanding of digital tools, using smartphones with farmers, coordination with relevant government agencies and access to online marketing. In general, our findings may be useful and important in the context of agricultural extension systems priorities in response to the COVID-19 outbreak, in Egypt, Nigeria, and other African countries with similar socio-economic conditions.

Based on the findings of the study, the following recommendations are proposed:

- Establishing an electronic extension platform that includes applications to be downloaded on mobile phones to provide information in the areas of agricultural extension and combating the Coronavirus to farmers in every geographical region, especially in Egypt.
- Create official pages on social networking sites (Facebook - YouTube - Twitter...) to publish the platform's extension outputs and online marketing, particularly in Egypt.
- Distributing smartphones and tablets to extension workers, and training them to use different interactive applications to follow up on farmers.
- Raising awareness of the rural population about required government mechanisms, social protection plans, and other precautionary measures of COVID-19 pandemic.
- Coordinate agricultural extension services (AES) actors including private and public sectors, non-governmental organizations (NGOs), producer organizations (POs), and ministry of health (MOH) to face this crisis, especially in Egypt.

REFERENCES

Abdelhafiz, A. S., Z. Mohammed, M. E. Ibrahim, H. H. Ziady, M. Alorabi, M. Ayyad and E. A. Sultan. 2020. Knowledge, Perceptions, and Attitude of Egyptians Towards the Novel Coronavirus Disease (COVID-19). Journal of community health, 45: 881-90.

Ajaero, J. O., J. U. Chikaire and G. O. Aminu. 2021. Rural Extension Professionals' Knowledge, Preparedness and Perceived Barriers to Control/Reduce the Spread of Covid -19 Pandemic in Imo State, Nigeria. Open access journal of Agricultural research, 6.

Ali, J. and W. Khan. 2020. Impact of COVID-19 pandemic on agricultural wholesale prices in India: A comparative analysis across the phases of the lockdown. Journal of Public Affairs: e2402.

Allegranzi, B. and D. Pittet. 2007. Healthcare-Associated Infection in Developing Countries: Simple Solutions to Meet Complex Challenges. Infection Control & Hospital Epidemiology, 28: 1323-27.

Barber, J., E. Mangnus and V. Bitzer. 2016. Harnessing ICT for agricultural extension, KIT- sustainable economic development. Working Paper Series 4.

Bereir, A. 2020. Impact of COVID19 on Sudan agriculture: the role of agricultural extension during the pandemic era. International Journal of Agricultural Science, Research and Technology in Extension and Education Systems, 10: 43-49.

Boyce, M. R. and R. Katz. 2019. Community Health Workers and Pandemic Preparedness: Current and Prospective Roles. Frontiers in public health, 7: 62-62.

Bright, P., T. K. Muvhuringi and N. C. Nyamuziwa. 2021. The impact of COVID-19 on agricultural extension and food supply in Zimbabwe. Cogent Food & Agriculture, 7.

Buys, D. R. and R. Rennekamp. 2020. Cooperative Extension as a Force for Healthy, Rural Communities: Historical Perspectives and Future Directions. American journal of public health, 110: 1300-03.

FAO. 2020a. Extension and advisory services at the frontline of the response to COVID-19 to ensure food security, on line, available at: http://www.fao.org/3/ca8710en/CA8710E...

———. 2020b. Gendered impacts of COVID-19 and equitable policy responses in agriculture, food security and nutrition. Rome. Available at: http://www.fao.org/3/ca9198en/CA9198EN.pdf. Place Published.

FAO, I. and UNICEF. 2021. WFP and WHO. 2020. The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets. Rome, FAO. Place Published.

Fayoum Governorate Site. 2021. Available at: http://www.fayoum.gov.eg/tourism/fayoumt/safha%20new183/default.aspx. Place Published.

Feder, G., S. Ganguly and J. R. Anderson. 2006. The Rise And Fall Of Training And Visit Extension : An Asian Mini-Drama With An African Epilogue. The World Bank. Place Published.

ILO. 2020. COVID-19 and the impact on agriculture and food security. Sectoral Brief, Sectoral Policies Department. International Labour Organization, Switzerland, available at: http://swww.ilo.org/wcmsp5/groups/public/---ed dialogue sector// documents/ briefingnote/wcms_742023.pdf .

Jat, S. and J. Yadav. 2016. Knowledge level of poultry farmers about recommended poultry farming practices. Indian Research Journal of Extension Education, 12: 51-54.

Khandait, V., S. Gawande, A. Lohakare and S. Dhenge. 2011. Adoption level and constraints in backyard poultry rearing practices at Bhandara District of Maharashtra (India). Res. J. Agric. Sci, 2: 110-13.

Nicola, M., Z. Alsafi, C. Sohrabi, A. Kerwan, A. Al-Jabir, C. Iosifidis, M. Agha and R. Agha. 2020. The socio-economic implications of the coronavirus pandemic (COVID-19): A review. International journal of surgery (London, England), 78: 185-93.

Niles, M. T., F. Bertmann, E. H. Belarmino, T. Wentworth, E. Biehl and R. Neff. 2020. The Early Food Insecurity Impacts of COVID-19. Nutrients, 12: 2096.

NPC. 2016. National Population Commission Estimated Population Figure. Abuja. National Population Commission of Nigeria. Available at: https://nationalpopulation.gov.ng.

Oduwole, O., I. Ndagi, O. Taiwo, I. Muhammed and S. Rahman. 2013. Socio-Economic Factors Affecting Use of Information Sources among Cashew Farmers in Niger State. Nigerian Journal of Agriculture, Food and Environment, 13: 769-73.

Olayemi, A. B. 2020. COVID-19 Pandemic- Accelerating the Use of Digital Agricultural Extension Tools in Nigeria, preprint.

Oyeranti, O. and B. Sokeye. 2020. 2020. The Evolution and Spread of Covid-19 In Nigeria, Centre for Petroleum, Energy Economics and Law (CPEEL), University of Ibadan. available at: https://cpeel.ui.edu.ng/publication/evolution-and-spread-covid-19-nigeria. Place Published.

Telg, R., T. Irani, N. Place, A. R. DeGroat, H. Ladewig, M. Kistler and R. Barnett. 2008. Disaster preparedness and professional and personal challenges of county Extension faculty during the 2004 Florida hurricane season. Journal of extension, 46.

Tripathi, R., S. S. Alqahtani, A. A. Albarraq, A. M. Meraya, P. Tripathi, D. Banji, S. Alshahrani, W. Ahsan and F. M. Alnakhli. 2020. Awareness and Preparedness of COVID-19 Outbreak Among Healthcare Workers and Other Residents of South-West Saudi Arabia: A Cross-Sectional Survey. Frontiers in public health, 8: 482-82.

Willy, D. K., Yacouba D., Hippolyte A., Francis N., Michael W. and T. W. 2020. COVID-19 Pandemic in Africa: Impacts on Agriculture and Emerging Policy Responses for Adaptation and Resilience Building, The Technologies for African Agricultural Transformation (TAAT) POLICY COMPACT WORKING PAPER. available at: https://www.aatf-africa.org/wp-content/uploads/2021/02/TAAT-Policy-Working-Paper-on-COVID19_FINAL-for-Dissemination_May-2020.pdf.

World Bank. 2020. Food Security and Covid-19. Understanding Poverty. available at: https://www.worldbank.org/en/topic/agriculture/brief/food-security-and-covid-19. Place Published.

Yamano, T., N. Sato and B. W. Arif. 2020. Impact of COVID-19 on Farm Households in Punjab, Pakistan: Analysis of Data from a Cross-Sectional Survey. Asian Development Bank. Place Published.

Yue, S., J. Zhang, M. Cao and B. Chen. 2021. Knowledge, Attitudes and Practices of COVID-19 Among Urban and Rural Residents in China: A Cross-sectional Study. Journal of community health, 46: 286-91.