JOURNAL OF AGRICULTURAL ECONOMICS, EXTENSION & SCIENCES
Official Journal of the College of Agricultural Economics and Extension
www.jaees.org
www.uam.edu.ng
Jaees Vol. 11 No.2 2025, Page 62-77
ISSN (Print) 2545-5179, ISSN (Online) 2714-5018

ASSESSMENT OF ADAPTATION STRATEGIES ADOPTED AMONG YAM FARMERS DURING CORONA VIRUS DISEASE PANDEMIC IN TARABA STATE, NIGERIA

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Abstract
This study was conducted to assess adoption strategies adopted among yam farmers during COVID-19 pandemic in Taraba State. A total sample size of 120 respondents was randomly selected from 8 rural communities of 4 Local Government Areas of the State. The Local Government Areas were Wukari, Ibi, Zing and Yorro. Data were collected from primary source using Structured questionnaire. The collected data were analysed using frequency and percentages, mean score, standard deviation and factor analysis. The result of the analysis revealed that majority (84.4%) of the respondents in Taraba State had one form of formal education or the other about 65% of the respondents had 6-10 persons in their households. Furthermore, planting few tubers during planting season (x=2.83), seeking the help of family members in farm labour (x=2.88) and rearing of small livestock (x=2.71) were some of the adaptation strategies employed by the respondents during the pandemic. Also, high cost of labour (0.83), government policies on COVID-19 were not well publicized (0.90) and poor access to farm credit (0.55) were some of the constraints experienced by the respondents during the pandemic. The study recommends that authorities should support farmers in value addition and product diversification to mitigate market disruptions and enhance income generation.

Keywords: Adaptation, Strategies, Corona virus,Disease, Pandemic

1.0 Introduction

A worldwide viral pandemic (SARS-CoV-2) was caused by 27 instances of pneumonia of unknown etiology that began in Wuhan (Hubei, China) on December 31, 2019 (Platto et al., 2021). The rapid increase in COVID-19-infected persons and the viral nature of the disease have led to many hospitalizations (Das et al., 2021). Animal-to-human transmission was first thought to be the cause of the virus. (CDC, 2020; Olivencia et al., 2020). Later, it was realized that human-to-human transmission was, in

fact, a common mode of viral spread (Guo et al., 2020; Deng & Peng, 2020).

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Nigeria announced its first confirmed case of COVID-19 disease on February, 27th, 2020 (Jacob et al., 2020). Within the first 30 days, the Nigeria Centre for Disease Control (NCDC) observed that 70% of the individuals that tested positive for COVID-19 were males, and 30% were females. Their ages ranged between 30 and 60 years. People aged 31-50 years were the most affected (39%) (NCDC, 2020). Furthermore, the situation in Nigeria calls for special attention because being a developing country, small-medium enterprises (SMEs) contributed 48% of the national gross domestic product (GDP) and accounted for 96% of the businesses and 84% of employment in the country (Public Works Corporation, 2020).

This confirmation led to the activation of the country's National Coronavirus Emergency Operation Centre (Adepoju, 2020). Emergency response team was activated at the highest level (NCDC, 2020). Public health campaigns and awareness were initiated early alongside the issuance of advisory against travel to and from high-risk countries (Ogundele, 2020). Also, a nationwide lockdown was announced (Ibrahim et al., 2020). During the Lockdown, people were obligated to stay at home for safety and could only go out to meet the most urgent needs, like buying food (Jibir et al., 2020) and medical-related services (Dixit et al., 2020; Balarabe, 2020).

Yam is a monocotyledon plant of the *Dioscorea* genus of the *Dioscoreaceae* family. It is a member of the *Magnoliophyta* division of the *Dioscoreales* order (Kumar et al., 2017). Global yam production grew at yearly average rate of 4.07% from 12.4 million metric tonnes in 1972 to 75.1 million metric tonnes in 2021 (Knoema, 2021). Yam's high carbohydrate content which includes fiber, starch and sugar contributes around 200 dietary calories per individual per day to 300 million people living in tropical regions indicating its potential as a food source (Kumar et al., 2017). No other crop has as much taboo and festivity as yam (Nyaboga et al., 2014), making it a highly cherished

ceremonial and traditional crop that plays significant roles in social festivities throughout the West African region (Aighewi et al., 2003).

Nigeria produces approximately 70–76% of the global yams, making it the highest producer in the world (Obidiegwu et al., 2020). The production value of yam in Nigeria surpasses that of the five other major staple foods combined: maize, rice, cassava, sorghum and millet (IITA, 2020). Taraba State is Nigeria's number one State for yam production (Knoema, 2020). The Tiv and Mumuye ethnic groups produce most of the yam in Taraba State. Yam markets where yam tubers and planting supplies are bought and sold are situated in Wukari, Zing, Mutum - Biyu and Maihula towns (Farauta et al., 2015).

In attempts to mitigate the effects of the pandemic on the economy, some monetary policy measures were announced by the Nigerian government through the Central Bank of Nigeria (CBN) (Otache, 2020). For families and SMEs, as well as the manufacturing and health sectors that the pandemic had severely impacted, the CBN approved a loan facility and the Federal Government of Nigeria implemented palliative measures for specific groups including a three-month interest exemption for holders of loans from the Bank of Industry, Bank of Agriculture, and Nigeria Export and Import Bank to lessen the consequences of the lockdown (Eranga, 2020).

Furthermore, as part of an effort to alleviate the pandemic's impact on food systems, the Nigerian government launched seed support programme for farmers in 13 States of the country. These farmers received enhanced seeds of sorghum, pearl millet, cowpea and rice (Eranga, 2020). Through its Rural Poor Stimulus Facility (RPSF), the International Fund for Agricultural Development (IFAD) awarded grants to help Northern Nigeria's small-scale farmers and rural households that were most severely affected by the COVID-19 pandemic, as well as to aid in their recovery in the aftermath of the pandemic (IFAD, 2021). As Coronavirus affected global food production, the government built and boosted the capacity of Agricultural extension workers in yam production, an aeroponics system for the *production of disease-free yam seeds and the establishment of facilities for cold storage (Ajayi, 2020). Also, government introduced yam cultivation during dry season using Nasarawa and Benue States as pilot States (Ajayi, 2020).*

During COVID-19 pandemic, Global food systems had been disrupted. All aspects of the food value chain—production, distribution and consumption had been impacted. Ede (2020) found that, yam farmers in Nigeria during the pandemic experienced high cost of hired labour, scarcity and high cost of farm implements, lack of seed yam, difficulty in selling and transportation of yam crop produce, lack of palliative measures to address challenges experienced by yam farmers in area of yam production, harassment by security officials etc. Given that yam is a steady crop and Taraba State is Nigeria's largest producer, Adaptation strategies of yam farmers during COVID-19 pandemic would be a subject of interest. Thus, examining the state's yam farmers adaptation strategies could have a big impact on boosting food security as well as the State and National economies.

Some studies have assessed the effect of COVID-19 on agriculture, food supplies and food security in general (Siche, 2020; Workie et al., 2020; Mardones et al., 2020; Aromalan & Muyanga, 2020). Other studies assessed the impact of COVID-19 on yam value chain (Ufondu et al., 2021). In the study area, studies have centered on the effects of COVID-19 on food security and agribusiness activities (Collins et al., 2020; Adi et al., 2021).

Incidentally, empirical studies that documented the adaptation strategies of yam farmers during COVID-19 pandemic on yam production in the study area cannot be found as at the time of this study. These created research gap, hence posing significant challenges and rendering it exceedingly complex for governmental and private sector entities to determine effective strategies for assisting farmers in mitigating the adverse impact of the COVID-19 pandemic on yam production and the broader agricultural sector.

2.0 Objectives of the study

The Broad Objective of the study was to assess adaptation strategies adopted among yam farmers during COVID-19 pandemic in Taraba State, Nigeria. Specifically, the study sought to:

1. describe the socio-economic characteristics of yam farmers.
2. identify adaptation strategies used by yam farmers during COVID -19 Pandemic, ands

3. ascertain constraints to adaptation strategies experienced by yam farmers during COVID-19 Pandemic.

3.0 Methodology

3.1 The study Area

The study was conducted in Taraba State, Nigeria. The State is one of the states in north east geopolitical zone. The State lies within latitudes 6˚ 30' to 9˚40'N and longitudes of 9˚ 00' to 11˚00E' East of Greenwich Meridian (Ikusemoran et al., 2018). The State has a land area of 54,473km^2 and a population of 3,331,885 people (National Bureau of Statistics, 2020). Taraba State is Nigeria's leading yam producer, contributing about 13 percent of the country's total yam production (Daniel, 2022).

3.2 Population and Sample Size

Sampling Procedures

The population of the study comprised all yam farmers in Taraba State. A multi-stage Sampling procedure was used to select the sample size (120). In the first stage, two senatorial zones (Northern and Southern senatorial zones) were purposively selected for the study because of their proven strength and popularity in yam production. In the second stage, two high yam producing Local government areas were purposively selected from each of the senatorial zones giving a total of four Local Governments Areas (Wukari, Ibbi, Yorro and Zing). In the third stage, two dominant yam farming town communities were purposively selected in each of the selected Local Governments Area, giving 8 rural communities (Monkin, Yakoko, Pantisawa, Mumuye, Tsukundi, Rimi Uku, Puje and Sarkin Kudu). In the fourth stage, one village community was purposively selected from each of the selected rural communities making a total of 8 rural communities (Bibong, Della, Nyajja, Dilla, Avyi, Bye-Pyi, Gindin Waya and Masu).

In the final stage, 120 respondents were interviewed from the selected rural communities, for this study. This was done by selecting every yam farmer randomly not minding their status in the community. The process was repeated until the required sample size was obtained.

The sample size was determined by using the formula given by Taro Yamane (1967):

$$n = \frac{N}{1+N(e)^2}$$

Where;

n = sample size;

N = population of the study;

E = error of margin taking at 5% level

Therefore, a total of 120 yam farmers were selected proportionally for the study.

$$n = \frac{251}{1+251(0.5)^2}$$

$$n = \frac{251}{1+251(0.0025)}$$

$$n = \frac{251}{1+0.6275}$$

$$n = \frac{251}{1.6275}$$

$$n = 120.43$$

4.0 Result And Discussion

4.1 Socio-economic Characteristics of yam Farmers

Level of education

Table 1 reveals the educational level of the respondents. About 26.7% of the respondents completed secondary school, 21.7% had OND/NCE, 19.2% had non formal, 15.0% completed primary school, 11.7% had B.Sc/HND, 4.2% attempted secondary school while 0.8% each had post graduate education (PGD/ MSc/ PhD) . This coincides with Adi et al. (2021) that 84.4% of farmers in Taraba State had one form of education or the other. It also indicates that respondents had formal education, which by implication improves farmers' ability to think critically and make reasonable decisions in times of crisis.

Household size

Table 1 reveals that majority (65%) of the respondents had 6-10 persons in their household, 30% of the respondents had household size of 1-5 persons, while 5% of the respondents had 11-15 persons in their households. The mean household size was 5 persons. The result implies that the respondents had large household size which can be beneficial for yam production as it provides an advantage in terms of availability of labour. The COVID-19 lockdown resulted in a labour shortage on farms, thus presenting an opportunity for farmers to utilize household labour to increase farm yield and income. Abiodun et al. (2020) reported that 65% of households had more than five persons, which is advantageous in terms of household labour in South western Nigeria.

Membership of social organisations

Table 1 shows that majority (83.3%) of the respondents were members of social organisations, while 16.7% were not members of any social organisation. Farmers who are members of social groups can benefit from a number of resources, including political influence, networking opportunities, collective bargaining power, information access and access to financial facilities. Being a member of social organizations can be especially beneficial in times of crisis, like the COVID-19 pandemic, as it offers farmers emotional and social support. When farmers unite together, they may exchange experiences, give guidance and encouragement and draw strength from their common dedication. This agrees with Ezeokafor et al. (2019), that undoubtedly, being a member of a cooperative has facilitated the acquisition of certain benefits that could have been challenging to access for non-members.

Socio-economic Characteristics of Farmers

Table 1: Socio-economic characteristics of farmers (n120)

Variables	Frequency	Percentage	mean
Sex			
Male	87	72.5	
Female	33	27.5	
Marital Status			
Single	35	29.2	
Married	82	68.3	
Divorced	2	1.7	
Widowed	1	0.8	
Age(years)			
20 – 29	26	22.0	
30 – 39	58	49.2	
40 – 49	26	22.0	34.9
50 – 59	2	1.7	
60 and above	6	5.1	
Level of Education			
Non formal education	23	19.2	
Primary School attempted	1	0.8	
Primary school completed	18	15.0	
Secondary School attempted	5	4.2	
Secondary school completed	32	26.7	
Tertiary	41	34.2	
Household Size			
1 – 5	36	30.0	
6 – 11	78	65.0	
12 and above	6	5.0	5
Membership of organization			
Member	100	83.3	
Not member	20	16.7	
Years of experience in yam farming			
1-10	32	26.7	
11 – 20	53	44.2	17.65
21 – 30	29	24.1	
31 and above	6	5.0	
Farm size allocated to yam production			
1 – 5	108	91.5	
6 – 9	9	7.6	2.75
10 and above	1	0.8	
Annual Income from yam farming			
100 – 100,000	5	4.0	
100,001 – 300,000	34	28.6	
300,001 – 500,000	40	33.6	603291.67
500,001 – 900,000	26	21.8	
900,001 – 1,500,000	8	7.0	
1,500,001 – and above	6	5.0	

Source: Field survey(2023)

4.2 Respondents' adaptation strategies during COVID-19 pandemic

Table 2 shows the adaptation strategies adopted by the respondents. The result shows that farmers resorted to various strategies to adapt to the adverse effects of COVID-19 pandemic. These include: planting few tubers during planting season (x=2.99), seeking

the help of family members in farm labour (x=2.88), rearing of small livestock (x=2.71), reducing food consumption (x=2.68), planting alternative crops (x=2.27) and engaging in petty trade (x=2.23). The aforementioned adaptation strategies depict the resourcefulness and resilience exhibited by the study area's respondents during the COVID-19 pandemic. They demonstrated a proactive approach towards preserving livelihoods, guaranteeing food security and adjusting to changing circumstances. Acknowledging and endorsing these strategies can provide valuable insights for policies and interventions that target the improvement of local economies, community resilience and food security.

The study of Agbuba et al. (2022), on the evolving state of food security in Nigeria amidst COVID-19 pandemic, reveal that the major limiting factor for subsistence and smallholder farmers was the reduced overall farm production. Similarly, Esiobu (2020) conducted a study on the effects of COVID-19 pandemic on rice production in Southeast Nigeria and found that the COVID-19 pandemic resulted in a scarcity of available farm labour leading farmers to resort to utilizing labour from their households in order to enhance their farm productivity. Also, Munonye et al. (2022) conducted a study on the perceived effects of COVID-19 on food security in Southeast Nigeria, and found that the COVID-19 pandemic introduced intense food scarcity, excruciating hunger, pain and food insecurity.

Table 2 also reveals that respondents adapted less to the following strategies: use of alternative medicine to combat COVID-19 disease (x=1.97), engaging in hands washing (x=1.89), adoption of mechanized farming (x=1.88), borrowing money and selling household assets (x=1.79), receiving government palliatives and COVID-19 relief fund (x=1.43), etc. These posits that respondents did not adequately adapt to the adverse effect of COVID-19 pandemic. According to most respondents, corrupt government officials diverted relief support intended to be distributed to them to cushion the effect of the pandemic for their personal use.

Table 2: Perceived adoption strategies adopted COVID-19 Pandemic

Adaptation Strategies	Mean	Std. Deviation
Planting few tubers during planting season	2.99*	2.83
Seeking the help of family members in farm labour	2.88*	0.36
Rearing of small livestock	2.71*	0.63
Reducing food consumption	2.68*	0.65
Planting alternative crops	2.27*	0.93
Engaging in petty trade	2.23*	0.92
Use of alternative medicine to combat COVID-19 disease	1.97	0.89
Engaging in hands Washing	1.89	0.92
Adoption of mechanized farming	1.88	0.86
Receiving donations from friends and family	1.84	0.86
Borrowing money at interest rate	1.79	0.92
Selling household assets	1.79	0.87
Establishment of food banks	1.62	2.80
Receiving donations from organizations/NGOs	1.57	0.83
Selling farm produce at the front of house or the nearest open public space	1.57	0.83
Hawking of farm produce within neighborhood	1.54	0.80
Taking advantage of internet through social media and other agricultural phone applications to access agricultural extension information	1.46	0.79
Receiving Government palliatives and COVID-19 relief fund	1.43	0.73
Distributing children/dependents to rich family members	1.22	0.57

Source: Field survey(2023).Cut-off point 2.0

4.3 Constraints to adoption of adaptation strategies to mitigate the effects of COVID-19 pandemic

Table 3 shows the result of rotated matrix indicating the extracted factors of the response of yam farmers. The result shows that 4 major factors were extracted. Factor 1 (Lockdown related constraints), 2 (Information related constraints), 3 (Palliative related constraints) and 4 (Corruption related constraints).

The loading variables grouped under factor 1(Lockdown related constraints) are: high cost of labour (0.83), scarcity of hired labour (0.82) and difficulty in acquiring farm inputs (0.63). These constraints were largely aggravated as a result of the COVID-19

pandemic lockdown. According to most respondents high cost of labour is as result of many workers have shifted to other sectors that promises more secure income. At the height of the pandemic, farmers had to offer higher wages for labour coupled with increase in price of inputs (Oluoch, 2024). Scarcity of hired labour is not unconnected with the fact that lockdowns have limited the ability of farm labourers to travel to rural areas. Also, some labourers might not be willing to travel due to fear of contracting the virus. Idu (2021), asserted that Nigerian agriculture is dominated by manual labour but the COVID-19 Pandemic has intensified this dependence by limiting access to hired labour.

The loading variables under factor 2 (information related constraints) are: information on COVID-19 is technical/ cumbersome to understand (0.94); government policies on COVID-19 are not well publicized (0.90); insufficient power supply to watch television and have access to reliable news on COVID-19 pandemic (0.87); communication/ language barrier in getting information about COVID-19 pandemic (0.81). Some respondents assert that information on COVID-19 is technical/ cumbersome to understand (0.94), The communication medium in the study area was found to be local languages, not English. Also, some medical terms like 'pandemic', 'COVID-19', and 'quarantine' cannot be easily translated into local languages. Dan-Nwafor et al., (2020), found that some technical jargons such as 'social distancing', 'lockdown', 'RDT' which were use during the pandemic where confusing to many individuals in rural areas. Also, insufficient power supply to watch television and have access to reliable news on COVID-19 pandemic (0.87), this is not unconnected with the fact that many rural communities are not connected to national grid and are experiencing epileptic power supply, thus, hindering their reliance on television as a source of information.

The loading constraints under factors 3 (Palliative related constraints) are: Diversion of COVID-19 pandemic palliative meant to cushion the adverse effect of the pandemic (0.85) and inadequate Information about pandemic palliative (0.82). The implication of diversion of the pandemic palliative depicted that yam farmers are left vulnerable during the pandemic and forced to adopt other coping strategies such as selling their assets and obtaining loan which has long term effect. Obakemi et al., (2022), found that many

Nigerians alleged that distribution of pandemic palliative is marred by corruption as many households did not receive any support. Also, lack of adequate information about pandemic palliatives is as a result of lack of access to communication channels such as internet and television. Also, lack of transparency in distribution of support will limit awareness in rural areas.

The loading variable under factor 4 (Corruption related constraints) are: insincerity among farmers in giving accurate information to government officials (0.76), harassment/payment of bribes/seizure of farm produce by security personnel (0.74) and poor access to farm credit (0.55).

According to most respondents, despite exemption of agricultural activities from lockdown restrictions, farmers were forced to pay bribes to law enforcement agencies when transporting farm produce or inputs. Similarly, farm credits which are meant to support farmers during the pandemic were difficult to get. Due to a lack of liquidity in financial institutions as well as difficult credit risk management, many farmers reported having trouble getting credit compared to the time before the pandemic (Koloma &

Table 3: Constraints to adoption of adaptation strategies during COVID-19 pandemic

Variables	Factor 1	Factor 2	Factor 3	Factor 4
Diversion of Covid-19 pandemic palliative meant to cushion the adverse effect of the pandemic on farmers	0.13	0.09	**0.85*****	0.0
Inadequate Information about pandemic palliativ	0.23	0.03	**0.82*** **	0.0
Insincerity among farmers in given accurate information to government officials	0.15	-0.07	-0.04	**0.76*** **
Harassment/payment of bribes/seizure of farm produce by security personnel	-0.17	0.27	0.21	**0.74*** **
Difficulty in acquiring farm inputs	**0.63***	0.08	0.29	0.2
Poor access to farm credit	0.12	-0.07	0.04	**0.55*** **
High cost of labour	**0.83***	-0.05	-0.09	0.1
Scarcity of hired labour	**0.82***	0.01	0.24	-0.0
Communication/ language barrier in getting information about covid-19 pandemic	0.27	**0.81*** **	-0.11	0.0
Insufficient power supply to watch television and have access to reliable news on covid-19 pandemic	-0.03	**0.87** **	0.02	0.0
Information on Covid-19 are technical/ cumbersome to understand	0.01	**0.94** **	0.22	0.0
Government policies on covid-19 are not well publicized	0.02	**0.90** **	0.21	-0.0

***Factor 1: Lockdown constraints**
****Factor 2: Communication constraints.**
*****Factor 3: Palliative constraints.**
******Factor 4: Corruption constraints.**
Source: Field survey (2023)

5.0 Conclusion and Recommendations

5.1 Conclusion

The study found that due to disruptions caused by the pandemic, respondents used adaptation strategies such as planting few seed yams, seeking help of family members in farm labour, reducing food consumption etc. Some of the constraints faced by yam farmers were: lack of information on marketing channel, scarcity of hired labour, corruption among government officials etc.

5.2 Recommendations

The study recommends that government should develop and strengthen market linkages for yam farmers. This can involve creating direct marketing channels, establishing partnerships with local markets or processing industries and supporting farmers in value addition and product diversification to mitigate market disruptions and enhance income generation. Also, government should grant direct financial aids to yam farmers in order to offset pandemic related losses and expand access to credit facilities.

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