EFFECTS OF SAVINGS AND INVESTMENT ON FOOD SECURITY STATUS OF FARM HOUSEHOLDS IN SELECTED LOCAL GOVERNMENT AREAS OF NIGER STATE, NIGERIA

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ABSTRACT

The study examined effects of savings and investment on food security status of farm households in Agaie and Katcha local government areas of Niger State, Nigeria. A total of 120 respondents were used for the study and data collected through interview and questionnaire process. Descriptive statistics, food security index, Ordinary Least Squares (OLS) regression and Exploratory Factor Analysis (EFA) were used to analyze the data. The results revealed the mean age, household size, and farming experience were 38 years, 7 members and 19 years, respectively. Results of the savings and investment pattern revealed that the farmers saved the money in form of cash in the Bank, rotational savings, daily contribution savings and cooperative societies with mean savings of ₦279,500. The farmers also invested in buying of produce, livestock, contract farming, trading and agricultural processing with mean amount of ₦231,250. Result of the food security status revealed that 53% of the farm households were food secured while 47% were food insecure. The OLS regression analysis revealed that savings, investment, educational level, farming experience, farm size, membership of association and credit increased food security of farm households. In the contrary, age and household size decreased food security of the farm households in the study area. Result of the EFA revealed that constraints to savings and investment were personal status, administrative and production challenges. It was therefore recommended that farmers be encourage to form savings societies so as to pool their resources together to enable them boost their production and investment capacity and invariably increase their savings. Government and non-governmental organizations (NGOs) should help improve farm household's access to free education as it increases food security. Farmers should be encouraged to insure their businesses so as to cover their losses due to risks.

Keywords: Exploratory factor analysis, Farm households, Food security, Investment, Savings.

INTRODUCTION

Food insecurity is a major problem facing the world. According to Food and Agriculture Organization (FAO, 2017) about 1 billion people around the world are chronically undernourished and food insecure. Most of these population are found in developing countries, especially in Asia and Africa which poses considerable threat to international commitment to ending hunger by 2030 (FAO, 2017). Studies conducted by Shala and Stacey (2012) found out that the average amount of food available per person per day in Sub-Saharan Africa was 1,300 calories, compared to the worldwide average of 2,700 calories. In order to achieve a sustainable economic development in developing countries like Nigeria the people needs to be well-nourished and healthy. A food-secured person constitutes a pool of potential capable of transforming a nation into a developed state (Akerele *et al.*, 2013). Lending credence to the issue of food insecurity, Orewa and Iyangbe (2010) and Akerele *et al.* (2013) revealed that food insecurity rate among rural people and low-income urban households in Nigeria were

71% and 79%, respectively. More so, the Global Food Security Index (GFSI) (2019) of the Economist Intelligence Unit ranked Nigeria 94th among 113 countries in terms of food affordability, availability and quality, and safety in 2019.

As pointed out by Matemilola and Elegbede (2017), food insecurity in Nigeria was driven by insufficient food production, gender inequality, inefficient policies, corruption, conflict, civil insecurity, climate change, natural disasters and low technology for processing and storage and diseases outbreak like corona virus. Various programs and policy frameworks are designed to address food insecurity and malnutrition in Nigeria, including: the National Accelerated Food Production Project (NAFPP), Operation Feed the Nation (OFN), Agricultural Development Program (ADP), Structural Adjustment Program (SAP), National Poverty Eradication Program (NAPEP), National Economic Empowerment and Development Strategy (NEEDS), Millennium Development Goals (MDG), Agricultural Transformation Agenda (ATA) and Agricultural Promotion Policy (APP). However, as noted by Akinyele (2009) and Aboaba *et al*. (2020), these programs have recorded few successes, with the lackluster performances being largely attributed to the mis-targeting of interventions.

Food security concept is believed to have originated four decades ago in the mid-1970s in the first world food conference and was narrow in its coverage and definition. Although there is no consensus definition about the concept of food security and the concept is multifaceted implying that food security varies over time and space. Whatever definition is been adopted by a researcher, the concern is only on how it can be achieved and sustained either at household, community or even the national level. According FAO (2006), food security exists when all people, at all times, have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. With boosting awareness and dynamism of vulnerability to risks of food shortages, a more comprehensive and multidimensional approach to the concept of food security became emergent.

In the view of United States Department of Agriculture (USDA, 2008), food security for a household means access by all members at all times to enough food for an active, and healthy life. Food security includes at a minimum; the readily availability of nutritionally adequate and safe foods, and an assured ability to acquire acceptable foods in socially acceptable ways, that is, without resorting to emergency food supplies, scavenging, stealing, or other coping strategies. Food insecurity refers to a nation's inability to guarantee ease of access, availability over time and space to food for its citizens due to inadequate food supply, increase in the demand for food, relative low income as a result of inflation and unemployment or any other exogenous or stochastic variable be it economic, cultural, demographic or social (Muktar, 2019).

Many programs and policies strategies have been developed to maintain agricultural production and achieve food security under changing climatic conditions. Because smallholder farmers are particularly vulnerable to climate change given their reliance on rain-fed agriculture, small land holdings, high poverty, low education levels, limited access to technical assistance, and lack of capital for implementing adaptation strategies, among other factors which are threat to food security and livelihoods of smallholder farmers globally (Harvey *et al*., 2018). These efforts are both in response to international agreements such as the Paris Climate Agreement and the United Nations Sustainable Development Goals (SDGs), which emphasize the importance of ensuring food security, as well as to national development agenda. Finding ways to improve the food security of smallholder farmers is critical in the presence of climate change and disease outbreak like Covid-19.

Over the centuries, policies for supporting farm households, their livelihoods and food security has essentially concentrated on three intervening instruments, that is, inputs, credit,

and empowerment through training. Each of these interventions has proven some limitations. Subsidization of agricultural inputs has proven costly and unclear efficacy. Microcredit has shown more modest impacts than initially believed with limited access to serve the target population. Training has proven expensive to fund and modest in its results (Abegaz, 2017). As a result attention should be geared towards savings and investment as a potential policy instrument for sustainably supporting farm households.

According to Ehrlich and Ehrlich (2009), Malthus famous theory of population argued that population exhibits a natural growth rate described by geometric progression while food production grew in arithmetic progression. Malthus further concludes that without restrains, there will be continued pressure on living standard both in terms of input and output. Malthus was more particular to agricultural production because of the fear of hunger and famine due to scarcity of land relative to the size of population. Malthus posits that population will soon outstrip the available resources and signified disaster; he therefore hypothesized checks both natural and moral that will control population. These checks include hunger, famine war, abstinence from sex etc. However Malthus failed to consider the technological advancement and international trade in improving food situation. Despite the above the Malthusian theory of population have succeeded in explaining the food insecurity situation especially in developing countries like Nigeria where there are constraints to technological progress and international trade and at the same time the growth in food production is not encouraging.

Savings affect food security through its impact on access to food, that is, through mechanisms that affect a household's ability to purchase and/or produce food. Literature suggests three potential effects of savings and investment on food security. The first is through consumption smoothing. Farm households in Nigeria earns few and strongly seasonal income, have few and inefficient means of storing their earnings, yet face an annual and acute period of penury the "hungry season" when money is most urgently needed for food. To the extent that incomes are essentially agricultural, rural households receive revenue only when reaping their harvest. This means that their income whether in-kind (harvested food crops) or monetary (sold crops) are received in large lump sums at harvest, and must be made to last until harvest next year. But farm households have limited means of storing their incomes from one harvest to the next. Savings could provide households a mechanism for accumulating funds during harvest and drawing it down quickly during lean season which is more reliable and efficient (Abegaz, 2017).

The second mechanism is through bearing greater risk. Farm households are risk averse by necessity. The least error in decisions about income-generating activities could have large ramifications for household welfare. A failed crop could mean the household has less and perhaps next to nothing to eat. A failed business could mean having less or money on hand for purchasing food, particularly during the hungry season. Conscious of these potentially disastrous outcomes, poor households adopt low-risk, low return income-generating activities, planting crops or operating businesses that produce low but reliable returns. In other words, poor households avoid riskier but otherwise potentially profitable activities for fear of their downside risk. Savings could provide a superior self-insurance mechanism for bearing greater risk and reaping greater returns (Dercon and Christiaensen, 2007; and Abegaz, 2017).

The third mechanism is through upgrading production. Poor rural households face pecuniary obstacles in investing in the inputs for their income-generating activities. For a variety of reasons whether because of self-control or demands from others, households may be unable to accumulate adequate funds for purchasing necessary inputs. Savings could furnish a safe place for households to amass money for making the large lump-sum payments required for many productive inputs and could also protect household savings from theft or loss. In

particular, changes in these behavioral mechanisms should translate into changes in food security indicators. This may translate into more food and more income to buy food (Abegaz, 2017).

It is against this background that the research was carried out, although there are growing literatures on food security but there is no literature on the effects of savings and investments on food security among farm households in the study area. The study was therefore aimed to help fill the knowledge gap on the levels of food insecurity and broadly to examine effects of savings and investment on food security status of farm households in selected local government areas of Niger State, Nigeria. The specific objectives were to: describe the socio-economic characteristics of the farm households; investigate their savings and investment pattern; determine their levels of food insecurity; determine the effects of savings and investment on their food security status; and identify their constraints to savings and investment in the study area.

MATERIALS AND METHODS
The Study Area
The study was conducted in selected Local Government Areas (LGAs) in Niger State of Nigeria. The State is situated in the North central geo-political Zone between Latitudes 8° 20^1 and 11° 30^1 North of the Equator and also between Longitudes 3° 30^1 and 7° 20^1 East of the Greenwich Meridian. The 2019 projected population based on the 2006 census at 2.5% growth is 5,445,458 (World Bank, 2016). Niger State covers a total land area of 83,266,779 kilometers or about 8.3 million hectares which represent 8% of the total land area of Nigeria. About 85% of the land is arable; the vegetation consists mainly of short and scattered trees. Soils are predominately light and well drained. The State experiences distinct dry and wet seasons with annual rainfall varying from 1,100 mm in the Northern part to 1,600 mm in the southern parts. The temperature ranges from 23^oC to 37^oC and daylight duration is averagely 8.5 hours and it has a relative humidity of 40%. The major economic activity is agriculture (farming, fishing and livestock rearing).
Sampling Procedure and Sample Size
A multi-sampling procedure was employed in the collection of data for the study. As presented in Table 1, the first stage involved random selection of two (2) LGAs (Agaie and Katcha) in the State. In the second stage, two (2) communities were randomly selected from the two (2) selected LGAs, giving a total of four (4) communities. The third stage involved proportionate selection of 40% of the farm households in the selected communities following Nwadike (2016) and Adewumi (2017); therefore making sample size of 120 for the study.

Table 1: Study Frame and Size Selection Plan

LGAs	Communities	Sample frame	Sample size (40% of frame)
Agaie	Agaie town	80	32
	Kutiriko	72	28
Sub-total	2	152	60
Katcha	Katcha town	77	30
	Bakeko	76	30
Sub-total	2	153	60
Total	4	305	120

Source: Field survey, 2019

Method of Data Collection

Data were obtained through the use of questionnaire administered to 120 farm households. Information that was collected includes socio-economic and institutional characteristics of the farmers, savings and investment patterns, food consumption pattern and constraints to savings and investments. On the data analysis, descriptive statistics such as frequency distribution, percentages, mean and standard deviation were used to describe the socio-economic characteristics, and also the various savings and investment activities. The level of food security status of the farm households were determined using food security index. The farm households were then classified as food secure and food insecure using food security index formula given in equation 1:

$$F = \frac{Per\ capital\ food\ expenditure\ for\ the\ ith\ household}{\frac{2}{3}mean\ per\ capital\ food\ expenditure\ of\ all\ households} \qquad \dots (1)$$

where;

F = Food security index; when $F = \geq 1$ = food security i^{th} farm household, $F = < 1$ = food insecure i^{th} farm household. A food secure household is therefore, those that per capital monthly food expenditure is equal or greater two-third of the mean per capital food expenditure. On the other hand a food insecure household is that whose per capital food expenditure falls below two-third of the mean monthly per capital food expenditure (Omonona *et al.*, 2007).

Analytical Techniques

Ordinary least square regression (OLS) was used to determine the effects of savings and investment on food security status of farm households. The empirical OLS model in its explicit form is specified in equation (2):

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \mu \qquad \dots (2)$$

where;

Y = Food security status of the farm household (food security index generated);

X_1 = Age of the household head (years);

X_2 = Savings (amount saved in NGN);

X_3 = Investment (amount invested in NGN);

X_4 = Household size (number of persons);

X_5 = Highest educational status in the household (number of years spent in school);

X_6 = Farming experience (years);

X_7 = Farm size (hectares);

X_8 = Membership of association (number of associations);
X_9 = Loan from friends/relatives (yes = 1, no = 0);
X_{10} = Loan from cooperatives (yes = 1, no = 0);
X_{11} = Loan from money lenders (yes = 1, no = 0);
X_{12} = Loan from Bank of Agriculture (yes = 1, no = 0);
X_{13} = Loan from Microfinance Bank (yes = 1, no = 0);
X_{14} = Loan volume (amount in NGN);
β_0 = Constant/intercept to be estimated;
$\beta_1 - \beta_7$ = Coefficients to be estimated;
μ = Error term.

Constraints to savings and investments were identified using Exploratory Factor Analysis (EFA). Factor analysis is a data reduction technique used to reduce a large number of variables to a smaller set of underlying factors that summarize the essential information contained in the variables. The EFA utilized in the study is the Principal Component Analysis (PCA). PCA was used to group the constraints with the aid of principal factor method with varimax orthogonal rotation method developed by Kaiser [36]. The model is presented in equation (3):

$$Y_1 = a_{11}X_1 + a_{12}X_2 + *** + a_{1n}X_n$$
$$Y_2 = a_{21}X_1 + a_{22}X_2 + *** + a_{2n}X_n$$
$$Y_3 = a_{31}X_1 + a_{32}X_2 + *** + a_{3n}X_n \qquad \dots (3)$$
$$* \qquad\qquad *$$
$$* \qquad\qquad *$$
$$Y_n = a_{n1}X_1 + a_{n2}X_2 + *** + a_{nm}X_n$$

where;
$Y_1, Y_2, \dots, Y_n$ = Observed variables/ constraints to savings/ constraints to investment;
$a_1 - a_n$ = Constraint loading or correlation coefficients;
$X_1, X_2, \dots, X_n$ = Unobserved underlying factors constraining farm households to save/ invest.

To judge the sampling adequacy and the factorability of the matrix as a whole, Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) were used following Chong *et al*. (2013) and Sallawu *et al*. (2020).

RESULTS AND DISCUSSION
Socio-economic Characteristics of the Farmers

The result of the socio-economic characteristics of the farmers presented in Table 2 revealed that majority of the farmers were between the age of 21-50 accounting for 70% with mean age of 38 years. This implies that a typical farmer in the study area is still young and energetic to participate effectively in both farm and non-farm activities so as to increase their income which may positively influence their food security status. The result further revealed that overwhelming number of the farmers accounting for over 80% had formal education which implies that they can read and write which invariably would facilitate their level of technology adoption. The findings also indicated that the farmers had fairly large households with average of 7 members. Majority of the farmers accounting for over 60% had household sizes of between 5-16 members. In terms of farming experience, over whelming number accounting for over 80% had more than 10 years of farming experience with mean of 19 years. This implies that the farmers were highly experienced in farming which could help them cope with the challenges of farming and improve their food security status. Table 2 further revealed that majority of the farmers were male accounting for over 80% which implies that the male dominant the farming occupation in the study area. In other words the male were more into

farming than their female counterpart. This might be due to the norms and traditions of the people which do not always allow women to participate solely in farming. The result also revealed that over 80% of the farmers were married. This implies that they would have much responsibility to take care of the family and subsequently this would enhance productivity and improve their food security status. These results is in line with the findings of Sallawu *et al.* (2016) who affirms that an average farmers in Niger State is still young, married with large household size and are mostly male.

Table 2: Socio-economic Characteristics of the Farmers (n = 120)

Variables	Frequency	Percentage	Mean (Std. dev.)
Age (years)			
< 21	2	1.7	
21-30	28	23.3	
31-40	33	27.5	
41-50	24	20.0	
> 50	33	27.5	38(10)
Level of education (years)			
None	17	14.2	
Primary	27	22.5	
Secondary	36	30.0	
Tertiary	38	31.7	
Quranic	2	1.7	
Household size (number)			
1-4	29	24.2	
5-8	34	28.3	
9-12	27	22.5	
13-16	19	15.8	
> 16	11	9.2	7(2)
Farming experience (years)			
< 10	14	11.7	
10-20	58	48.3	
21-30	22	18.3	
> 30	26	21.7	19(10)
Gender			
Male	101	84.2	
Female	19	15.8	
Marital status			
Married	98	81.7	
Single	6	5.0	
Widow/Widower	7	5.8	
Divorce	5	4.2	
Separated	4	3.3	

Source: Field survey, 2019

Savings Activities of the Farmers

The result of savings activities of the farmers presented in Table 3 below revealed that almost half of the farmers saved their money in the Bank while few saved using rotational savings, daily contribution savings and cooperative societies. Meanwhile, 80% of the farmers had saved over ₦100,000 annually with mean of ₦279,500. This might be for the purpose of household consumption or farming expenses for the next cropping season. The implication of these findings is that agricultural production can still be favourable for savings if efficiently

managed. This result is in accordance with the findings of Babani (2015) who found out that farm households saved from income generated from both production of crop and livestock with average savings from farm and off-farm activities of ₦ 693,560.5 and ₦1,064000. This is also in agreement with the findings of Kozera *et al*. (2016) who affirmed that farmers' objectives of savings were more frequently than in the other socio-economic groups of households, to ensure provisions for running consumption expenditure, purchase durable goods and expand their economic activity.

Table 3: Saving Categories of the Farmers

Savings	Frequency	Percentage
Forms of savings		
Cash in Bank	57	47.5
Rotational savings	25	20.83
Daily contribution savings	22	18.33
Cooperative society	16	13.34
Estimated annual saving (₦)		
< 50000	2	1.66
50000-100000	21	17.5
100001-150000	15	12.5
150001-200000	38	31.67
200001-250000	5	4.17
250001-300000	13	10.83
> 300000	26	21.67
Average	279500	

Source: Field survey, 2019

Investment Patterns of the Farmers

Based on the pattern of investment by the farmers as presented in Table 4 below, over 30% of the farmers were into buying of produce and probably to resale during scarcity. 26% of the farmers were engaged in contract farming and few were into agricultural processing, involvement in trading and buying of livestock. More so, over 80% of the farmers had invested more than ₦100,000 with mean of ₦231250. This implies that apart from farming farmers invest in other businesses to earn more income so as to reduce poverty and to be food secured. This result is in line with the findings of Yona and Mathewos (2017) who found out that farm household invest in different activities so as to increase their total earning.

Food Security Status of the Farm Households

The result of the food security status of the farm households as presented in Table 5 below revealed that 52% of the farmers were found to be food secured while 47% were found to be food insecure. This implies that almost half of the farm households were food insecure which is alarming. This result is in line with the findings of Aboaba *et al*. (2020) who found out that large proportion of farmers in Southwestern Nigeria were food insecure.

Table 4: Investment Pattern of the Farmers

Investment	Frequency	Percentage
Type of investment		
Buying of produce	40	33.33
Buying of livestock	15	12.5
Contract farming	32	26.67
Involvement in trading	16	13.33
Agricultural processing	17	14.17
Estimated annual investment (₦)		
< 50000	0	-
50000-100000	21	17.5
100001-150000	25	20.83
150001-200000	38	31.67
200001-250000	5	4.17
250001-300000	5	4.17
> 300000	26	21.66
Average	231250	

Source: Field survey, 2019

Table 5: Food Security Status of Farm Households

Food security status	Frequency	Percentage
Food secured	63	52.50
Food insecure	57	47.50
Total	120	100

Source: Field survey, 2019

Effects of Savings and Investments on Food Security Status of Farm Households

The result of the Ordinary Least Squared regression analysis on the effects of savings and investments on food security status of farm households is presented in Table 6 below. Based on the results of the different functional forms presented, the linear model was chosen as the best fit based on the higher R^2 value (0.8660), Adjusted R^2 value (0.8496), F-value (52.69) and the least Root Mean Square Error (0.042). The R^2 value of 0.8660 implies that 86.60% of the variation in food security status of farm households was explained by the explanatory variables included in the model while the remaining 13.40% was attributed to errors in estimation and non-inclusion of some important explanatory variables. However, the significance of the F statistics suggested that the explanatory variables adequately explained the dependent variable. Out of the 14 explanatory variables included in the model, nine (9) were found to be significant at different probability levels.

The age of the household head was found to have a significant negative relationship with food security at 1% probability level. This implies that as the household head gets older their food security status tends to decrease probably because of the strength and energy to cultivate the land. This result is in line with the findings of Mota *et al*. (2019) who found out that age of household head was significantly and positively associated with food insecurity.

The coefficient of savings was positive conforming to *a priori* expectation and statistically significant at 1% probability level implying that as the household savings increases, their food security status tends to increase. This is probably due to the fact that savings could provide a safe situation for households to accumulate money for the purchase of productive inputs and coping during lean periods. This result is in agreement with the findings of Shaw

and Nagarajan (2011) who affirmed that access to formal savings facilitate household decisions that are apt to enhance household security over the longer term which enables households to assume incremental greater risk and grow more crops and also support households in diversifying their agricultural production.

The coefficient of investment was positively signed and statistically significant at 1% probability level indicating that as the household investment increases, their food security status tends to increase. This is because investment in other business might give the farmers the merit of generating income from different sources so as to cope with the challenges of climate change, disease outbreak, and enhance reduce poverty and food insecurity. This result is in line with the findings of Fitawek *et al*. (2020) who found out those investment opportunities from agribusinesses improved food security, dietary quality and resilience among farm households.

The coefficient of household size was negative and statistically significant at 1% probability level. This implies that as the household size increases, their food security status tends to decrease. Possibly because large household size exerts more pressure on consumption than the labour it contributes to production especially when the dependency ratio is higher. This result is in accordance with the findings of Mota *et al*. (2019) who affirmed that per capital food availability decline as family size increases due to population growth.

The coefficient of education was positive and statistically significant at 1% probability level indicating that as the educational attainment of the household head increases, their food security status tends to increase. This might be due to the fact that higher educational attainment increases income and better decision-making capacity. Education also affects food security through access to information on best agricultural practices and increased efficiency which in turns would enhance farm household food security. This is in accordance with the findings of Mutisya *et al*. (2016); and Ngema *et al*. (2018) who found that educational attainment has a positive and significant impact on food security status of farm households.

The coefficient of farming experience was positive and significant at 1% probability level implying that as the farmers farming experience increases, their food security status tends to increase. This is because the higher the farming experience the better the farmers could be in terms of adaptation to climate change. This result is in consonance with the findings of Ahmed *et al*. (2015) who revealed that as the farming experience increases, so does the probability of being food secured among farm households.

The coefficient of farm size was positive and significant at 1% probability level. This implies that as the farmers' farm size increases, their food security status tends to increase. The possible reason for this is that land is considered a critical production factor that determines the type of crop to be cultivated and the quantity of harvest to be realized. This result is in line with the findings of Mota *et al*. (2019) who pointed out that under subsistence agriculture, farm size is expected to play a significant role in influencing farm households' food security.

The coefficient of membership of association was positively signed and significant at 1% probability level. This indicated that as the farmers' membership of association/cooperative increases, their food security status tends to increase because members could derive benefits of learning from each other, access to market information and support from one another. This is in line with the findings of Olarinde *et al*. (2020) who revealed that the more the households actively participate and make cash contribution in social groups, the more food secured they would be.

Table 6: Effects of Savings and Investment on Food Security Status of Farm Households

Variable	Linear Coefficient (t-value)	Exponential Coefficient (t-value)	Double-log Coefficient (t-value)	Semi-log Coefficient (t-value)
Age	-0.005***	-0.231***	-0.236***	-0.005***
	(-11.61)	(-10.59)	(-10.42)	(-11.45)
Savings	2.51e-07***	0.057***	0.059***	2.53e-07***
	(6.57)	(13.52)	(13.42)	(6.38)
Investment	3.66e-07***	0.065***	0.067***	3.75e-07***
	(6.40)	(11.46)	(11.27)	(6.35)
Household size	-0.016***	-0.163***	-0.166***	-0.017***
	(-12.47)	(-12.26)	(-11.91)	(-12.19)
Educational level	0.017***	0.022***	0.024***	0.018***
	(15.05)	(8.42)	(8.88)	(15.21)
Farming experience	0.005***	0.172***	0.175***	0.006***
	(11.48)	(10.27)	(10.06)	(11.33)
Farm size	0.070***	0.149***	0.151***	0.070***
	(16.53)	(16.38)	(15.26)	(15.21)
Membership of association	0.109***	0.031***	0.033***	0.112***
	(25.81)	(12.75)	(13.90)	(24.74)
Loan from friends/relatives	0.004	0.001	0.001	0.006
	(0.24)	(0.24)	(0.28)	(0.28)
Loan from cooperative	0.018	0.003	0.003	0.020
	(0.67)	(0.67)	(0.73)	(0.73)
Loan from money lenders	-0.014	-0.002	-0.002	-0.015
	(-0.63)	(-0.63)	(-0.62)	(-0.62)
Loan from Bank of Agriculture	0.132	0.002	0.002	0.013
	(0.24)	(0.24)	(0.22)	(0.22)
Loan from Micro-finance Institutions	0.117	0.017	0.017	0.117
	(1.51)	(1.51)	(1.45)	(1.45)
Loan/credit amount	4.72e-07***	0.070***	0.072***	4.84e-07***
	(7.54)	(12.41)	(12.38)	(7.49)
R^2	0.8660	0.8390	0.8419	0.8516
Adj. R^2	0.8496	0.8193	0.8225	0.8334
F-value	52.69***	42.50***	43.43***	46.80***
Root MSE	0.04249	0.046	0.047	0.046

Source: Field survey, 2019

The coefficient of loan/credit amount was positive and significant at 1% probability level implying that as the credit amount increases, their food security status tends to increase. The possible reason for this is that loan services help farmers to make profitable investments that could increase yields and smooth their consumption patterns. Farm households with better access to credit and improved financial services might be better able to raise their living standards by engaging in more lucrative farming and non-farm income activities. These services are critical because their income comes all at once during harvest times, but they need funds at other times of the year, to purchase agricultural inputs during the planting seasons and to smooth their consumption between harvests. This result is in line with the findings of Sisha (2020) provided an empirical evidence on the importance of credit services for increased productivity and hence for better food security by affirming that availability of huge amount of credit positively affect household food security.

Result of the Exploratory Factor Correlation Analysis

Result of the Exploratory Factor Analysis (EFA) in Table 7 shows that all the 11 variables correlated at least 0.3 with at least one other variable which implies that the variables are correlated, indicating that there is relationship between the variables and also uniquely contributing to explaining the data matrix of the variables scale, suggesting reasonable factorability (Sallawu *et al*., 2020). Secondly, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.740 which is middling based on the KMO classification. The Bartlett's test of sphericity was significant (X^2 [120] = 655.324 P< 0.001) which shows that the matrix is significantly different from zero (0). This indicated that there are sufficient inter-correlations to conduct the factor analysis based on the results presented in Table 7. Given all the above indicators, factor analysis was deemed to be suitable with all 11 variable items.

Table 7: Kaiser-Meyer-Olkin Measure of Sampling adequacy and Bartlett's test of Sphericity

Analysis	Values
KMO	0.740
Bartlett test:	
Approx. Chi-square	655.324
Degrees of freedom	55
Sig.	0.000

Source: Field survey, 2019

Constraints to Savings and Investments by Farm Households

Based on the result of factor extraction on Table 8, the communality which is the percentage of variance for the variable that is explained by the common factors for all the variables were above 0.30. After the factor analysis as depicted in Table 8, the first combination of variables in the first factor explained 26.25% of the variance, the second factor explained 23.87% of the variance and the third factor explained 11.40% of the variance in the 11 variable scales. The true factors that were retained jointly explained 61.52% of the variance in the 11 constraining variables. After the varimax orthogonal rotation, the retained factors were: factor 1 (personal status constraints): Variables that load high in factor 1 were large family size (0.879), inadequate support (0.877), risk (0.760), inadequate income (0.580) and difficult in obtaining loan (0.437). Factor 2 (administrative constraints): Variables that load high in factor 2 were lack of trust (0.869), high charges (0.844) and high expenditure (0.805). Factor 3 (production constraints): Variables that load high in factor 3 were low agricultural yield (0.636), unstable government policies (0.592) and family position (0.560). This result is in line with the findings of Ike and Umuedafe (2013) who found out that the main constraints to accumulation of savings were low productivity and lack of access to financial credit. This is also in accordance with the findings of Mamman *et al*. (2019) who affirmed that major constraint militating against saving and investment capacity of the farmers include risk of capital lost, high expenditure on consumption and social obligation, poor access to credit and lack of banks branches.

Table 8: Constraints to Savings and Investments by Farm Households

Variable constraints	Factor loadings			Communality
	Personal status	**Administrative**	**Production**	
Large family size	0.879			0.786
Inadequate support	0.877			0.771
Risk	0.760			0.605
Inadequate income	0.580			0.506
Difficulty in obtaining loan	0.437			0.439
Lack of trust		0.869		0.771
High charges		0.844		0.761
High expenditure		0.805		0.659
Low agricultural yield			0.636	0.551
Unstable gov't policies			0.592	0.569
Family position			0.560	0.554
% of total variance	26.25	23.87	11.40	*61.52

Note: Extraction method is Principal Component Analysis; Rotation method is varimax with
     Kaiser Normalization; * = Total variance.
Source: Field survey, 2019

Internal Consistency Reliability for the Overall Scale

By utilizing factor rotation, it has established that there are constructs that consists of more than one variable. Meanwhile, it is important to calculate the internal consistency reliability for coefficient *alpha* for the whole scale and for each factor retained. Cronbach's *alpha* test was used to test the consistency between the items in the entire scale and for each factor. The Cronbach's *alpha* is based on the average inter-item correlation. According to Sallawu *et al*. (2020), a scale with a Cronbach's *alpha* higher than 0.7 is required in order to create a reliable construct of exploratory studies. Based on the results of the reliability consistency presented in Table 9, the internal consistency reliability for the overall scale, factors 1 and factor 3 were acceptable with values of 0.703, 0.748 and 0.774, respectively. The coefficient alpha for factor 2 was good with value of 0.837. This indicated that the responses were consistent and reliable. This also implies that the most severe constraint is personal status, followed by administrative and then production constraint.

Table 9: Reliability Analysis of the Scale and Factors Retained

Construct	Number of variables	Cronbach's *alpha* coefficient
Overall scale	11	0.703
Factor 1	5	0.748
Factor 2	3	0.837
Factor 3	3	0.774

Source: Field survey, 2019

CONCLUSION AND RECOMMENDATIONS

The study concluded that farm households in the study area operated a mean savings and investment of ₦231,250 and ₦279,500, respectively. Also, 53% of the farm households were food secured and 47% were food insecure in the study area. The study further revealed that savings, investment, educational level, farming experience, farm size, membership of association and credit increased food security of farm households. In the contrary, age and household size decreased food security of the farm households in the study area. Constraints to

savings and investment were personal status, administrative and production challenges. It was recommended that:

i.   Farmers should be encouraged to form savings societies so as to pool their resources together to enable them boost their production and investment capacity and invariably increase farmers' savings.

ii.   Farmers need to invest in off-farm businesses in order to increase their income and also serve as coping strategy.

iii. Government and non-governmental organizations (NGOs) should help to improve access to free education by farm households as it increases food security.

iv.   The cumbersome banking system should be improved so as to encourage financial savings by farm households.

v.   Farmers should be encouraged to insure their businesses so as to cover their losses due to risk.

REFERENCES

Abegaz, K. H. (2017). Determinants of food security: Evidence from Ethiopian Rural Household Survey (ERHS) using pooled cross-sectional study. *Agriculture & Food Security,* **6**(70): 1-7.

Aboaba, K. O., Fadiji, D. M. and Hussayn, J. A. (2020). Determinants of food security among rural households in Southwestern Nigeria: USDA food security questionnaire core module approach. *Journal of Agribusiness and Rural Development*, **2**(56): 113–124. Retrieved from: http://dx.doi.org/10.17306/J.JARD.2020.01295 on 13 August, 2020.

Adewumi, A. (2017). *Optimum production plans for cassava-based crop farmers in Kwara State, Nigeria.* Unpublished MTech thesis, Department of Agricultural Economics and Extension Technology, Federal University of Technology, Minna, Nigeria.

Ahmed, F. F., Eugene, C. E. and Abah, P. O. (2015). Analysis of Food Security farmers among Farming Households in Borno State, Nigeria. *Journal of Agricultural Economics, Environment and Social Science*, **1**(1): 130–141.

Akerele, D., Momoh, S., Aromolaran, A. B., Oguntona, C. R. B. and Shittu, A. M. (2013). Food Insecurity and Coping Strategies in South-West Nigeria. *Food Security*, **5**(1): 407–414.

Akinyele, I. O. (2009). *Ensuring Food and Nutrition Security in Rural Nigeria: An Assessment of the Challenges, Information Needs, and Analytical Capacity. Nigeria Strategy Support Program*. Background Paper No. NSSP 007, International Food Policy and Research Institute (IFPRI).

Babani, E. (2015). *Savings and investment behavior of small-scale farmers in Kauru and Lere local government areas of Kaduna State, Nigeria*. MSc thesis, Department of Agricultural economics and Rural Sociology, Faculty of Agriculture, Ahmadu Bello University Zaria, Kaduna State, Nigeria.

Chong, K. R., Yap, B. C. and Mohammed, Z. (2013). A study on the application of factor analysis and the distriutional properties of financial ratio of Malaysian companies. *International Journal of Academic Research in Management (IJARM)*, **2**(4): 83-95.

Dercon, S. and Christiaensen, L. (2007). *Consumption risk, technology adoption and poverty traps: evidence from Ethiopia.* Policy Research Working Paper No. 2007-06, CSAE Working Paper series from Centre for the Study of African Economies, University of Oxford.

Ehrlich, P. R. and Ehrlich, A. H. (2009). The population bomb revisited. *Electronic Journal of Sustainable Development*, **1**(3): 63-71.

Fitawek, W., Hendriks, S., Reys, A. and Fossi, F. (2020). The effect of large-scale agricultural investments on household food security in Madagascar. *Food Security*, **12**(1): 1349-1365.

Food and Agriculture Organization [FAO] (2006). *Food security.* O FAO, Paris.

Food and Agriculture Organization [FAO] (2017). *The future of food and agriculture: Trends and challenges*. Retrieved from: http://www. fao.org/3/a-i6583e.pdf. Accessed on 13 August, 2020.

Global Food Security Index [GFSI] (2019). *Annual Global Food Security Index Report.* Retrieved from foodsecurityindex.eiu.com/index. Accessed on 13th August, 2020.

Harvey, C. A., Saborío-Rodríguez, M., Martinez-Rodriguez, M. R., Viguera, B., Chain-Guadarrama, A., Vignola, R. and Alpizar, F. (2018). Climate change impacts and adaptation among smallholder farmers in Central America. *Agriculture and Food Security*, **7**(57): 1–20. Retrieved from https://doi.org/10.1186/ s40066-018-0209-x Agriculture. Accessed on 13 August, 2020.

Ike, P. C. and Umuedafe, D. E. (2013). Determinants of savings and capital formation among rural farmers in Isoko North Local Government Area of Delta State, Nigeria. *Asian Economic and Financial Review, Asian Economic and Social Society*, **3**(10): 1289-1297.

Kozera, A., Glowicka-Woloszyn, R. and Stanislawska, J. (2016). Savings behaviour in households of farmers as compared to other socio-economic groups in Poland. Journal of Agribusiness and Rural Development, **4**(42): 557-566. Available from: https://www.researchgate.net/publication/315995608_SAVINGS_BEHAVIOUR_IN_ HOUSEHOLDS_OF_FARMERS_AS_COMPARED_TO_OTHER_SOCIOECONO MIC_GROUPS_IN_POLAND. Accessed on 31 December, 2020.

Mamman, B. Y., Ahmad, M. M., Mustapha, A. and Malaba, K. M. (2019). Assesment of saving and investment capacity of small-scale tomato farmers in Jigawa State, Nigeria. *Production Agriculture and Technology (PAT)*, **15**(1): 13-22.

Matemilola, S. and Elegbede, I. (2017). The challenges of food security in Nigeria. *Open Access Library Journal*, **4**: e4185. Retrieved from https://doi.org/10.4236/oalib.1104185. Accessed on 13 August, 2020.

Mota, A. A., Lachore, S. T. and Handiso, Y. H. (2019). Assessment of food insecurity and its determinants in the rural households in Damot Gale Woreda, Wolaita zone, Southern Ethiopia. *Agriculture & Food Security*, **8**(11): 1-11.

Muktar, M. (2010). *Determinants of food insecurity in Nigeria: Application of Binary Choice Modelling Technique.* A Ph.D Dissertation. Bayero University Kano, Nigeria.

Mutisya, M., Ngware, M. W., Kabiru, C. W. and Kandala, N. (2016). The effect of education on household food security in two informal urban settlements in Kenya: a longitudinal analysis. *Food Security*, **8**(4): 743-756.

Ngema, Z., Sibanda, M. and Musemwa, L. (2018). Household food security status and its determinants in Maphumulo local municipality. *South Africa Sustainability (Switzerland)*, **10**(9): 1-23.

Nwadike, C. C. (2016). *Comparative economic analysis of yam and sweet potato marketing in Federal Capital Territory, Abuja, Nigeria.* Unpublished MTech thesis, Department of Agricultural Economics and Extension Technology, Federal University of Technology, Minna, Nigeria.

Olarinde, L. O., Abass, A. B., Abdoulaye, T., Adepoju, A. A., Adio, M. O., Fanifosi, E. G. and Wasiu, A. (2020). The influence of social networking on food security status of cassava farming households in Nigeria. *Sustainability*, **12**(2): 1-35.

Omonona, B. T. and Agoi, G. A. (2007). An analysis of food security situation among Nigerian households: Evidence from Lagos State, Nigeria. *Journal of Central European Agriculture*, **8**(2): 397-406.

Orewa, S. I. and Iyangbe, C. (2010). The struggle against hunger: The victims and the food and the food security strategies adopted in adverse conditions. *World Journal of Agricultural Science*, **6**(6): 740–745.

Sallawu, H., Tanko, L., Nmadu, J. N. and Coker, A. A. A. (2016). Poverty status of farm households in selected local government areas of Niger State, Nigeria. Asian Journal of Agricultural Extension, Economics and Sociology, **11**(3): 1-8.

Sallawu, H., Nmadu, J. N., Coker, A. A. A. and Mohammed, U. S. (2020). Factor path of constraints to adaptive capacity on climate change among IFAD-VCDP farmers in North Central Nigeria. *International Journal of Environment and Climate Change*, **10**(2): 13-33.

Shala, A. and Stacey, E. (2012). *United States Department of Agriculture: Economic Research Service.* Food Security Assessment, Regional Overview Information Bulletin.

Shaw, A. and Nagarajan, G. (2011). *Effects of savings on consumption, production and food security: Evidence from rural Malawi.* Financial Service Assessment Project, IRIS Center University of Maryland, Pp 32. Available at: http://www.fsassessment.utmd.edu. Accessed on 8th/12/2020.

Sisha, T. A. (2020). Household level food insecurity assessment: Evidence from panel data, Ethiopia. *Scientific African*, **7**(1): 1-6.

United States Department of Agriculture [USDA] (2008). *Food Security in the United States.* Retrieved from: http//www.USDA. Accessed on 13 August, 2020.

Yona, Y. and Mathewos, T. (2017). Assessing challenges of non-farm livelihood diversification in Boricha Woreda, Sidama zone. *Development Agricultural Economic*, **9**(4): 87-96.